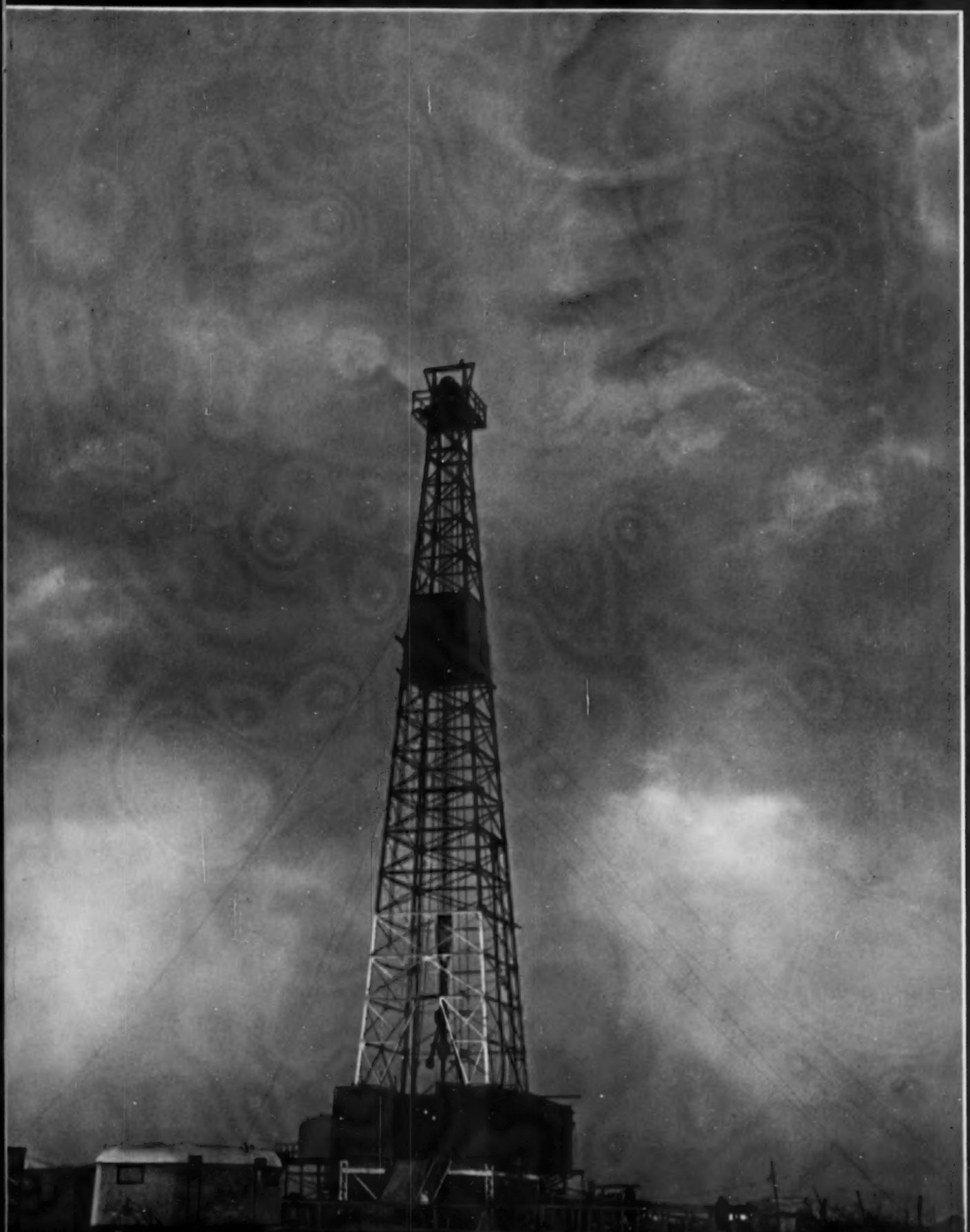
25 YEARS OF SERVICE TO THE INTERNATIONAL PETROLEUM INDUSTRY

WORLD PETROLEUM



OCTOBER 1955 FIVE DOLLARS PER YEAR • ONE DOLLAR PER COPY

Can you count the Cameron controls?

Probably not at this distance, but it's a safe bet you can count on them being there. Few indeed are the safety-conscious operators who would drill a deep wildcat on dry land without them, much less in the off-shore fields where hazards and costs are multiplied many times. Fortunately, Cameron provides protection for an operation like this. QRC Blowout Preventers keep things under control while pipe is out of the hole and while drilling. HRC Valves guard against loss of control through the flowline.

Cameron products mean economy, as well as protection. Flex-Seal Mud Valves require an absolute minimum of maintenance to control the high pressure abrasives that have destroyed ordinary valves in a matter of hours. Cameron Mud Line Pressure Gauges give correct readings at a glance . . . at a distance. Cameron Shear-Relief Valves protect pumps, rotary hose, and mud lines against excessive pressures.

Wherever you drill, take care . . . take Cameron. You *might* save your rig. You *will* save money.

Cameron

IRON WORKS, INC.

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Export Office: 7912 Empire State Bldg., New York City. In England: Cameron Iron Works Ltd., Time & Life Bldg., New Bond Street, London W. 1 England.

THIS IS CAMERON'S 35th YEAR OF SERVICE TO THE INDUSTRY

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"Newallastic" bolts and studs have qualities which are absolutely unique. They have been tested by every known device, and have been proved to be stronger and more resistant to fatigue than bolts or studs made by the usual method.

C. P. Newall & Co., Ltd.

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Over
50
Locations in the United States and Canada

McCullough® REPORTS TO THE OIL INDUSTRY

Service
Anywhere Anytime

New Services • • • New Tools • • • New Methods • • • Outstanding Results

Combination Magna-Tector and String Shot Back-Off Recovers 3431′ of Crooked Pipe in One Run

While McCullough's "One Trip Back-Off Service" is not yet available in every branch area, the many branches equipped to render this valuable service report the successful completion of some difficult back-off operations.

In this instance 3431′ of crooked drill pipe was recovered in one run in the hole. However, of greatest value to the operator was the fact that the Magna-Tector indicated that pipe could not be recovered from the lowest free point.

Operator was drilling below 3600′ with 4½" O.D. drill pipe and 6" O.D. drill collars when pipe became stuck. While attempting to free the pipe, the string parted about 100′ below the surface and dropped to bottom causing it to become corkscrewed and crooked.

After taking hold of the fish, McCullough's Magna-Tector was worked down the pipe and established a definite free point at 3609′ at the top of the drill collars. However, after double checking, it was found that torque could not be applied to the crooked drill pipe below 3440′. Therefore, the String Shot Back-Off was fired at the first collar that would back-off at 3431′. Only one shot was required and the free pipe was recovered from that point. The successful completion of this difficult operation required only one trip in the hole and saved the operator considerable time and money.

Check with your nearest McCullough service location about McCullough's "One Trip Back-Off Service." It is available in an increasing number of areas.

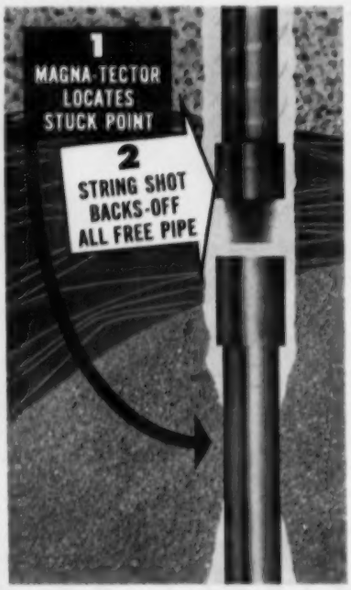
Magna-Tector, String Shot Back-Off Recover Stuck Pipe from 12,200′

High Efficiency and Small O. D. of McCullough's Magna-Tector and String Shot Back-Off Permit Recovery of Full String of 2⅞" Drill Pipe

Substantial rig time and fishing expense were saved by McCullough's Magna-Tector (Free Point Finder) and String Shot Back-Off in recovering this string of small diameter drill pipe.

The operator was running in the hole with 2⅞" drill pipe and was only 90′ off bottom when the drill pipe parted 200′ below the surface, dropping the entire string.

McCullough Tool Company ran in with a socket and took hold of the parted pipe. Following this, a String Shot Back-Off was run which backed off the pipe two joints below the socket.



McCullough Magna-Tector and String Shot Back-Off locate the lowest point from which pipe may be recovered and loosen all free pipe in a matter of hours compared to the days needed by mechanical methods.

And, the "One Trip Back-Off Service" will save an additional 50% in rig time in the areas in which it is available.

Socket was removed and operator ran back in and screwed into the fish. After working the pipe a short time it again parted, this time at about 300′.

Again, a socket was used to catch the fish and the McCullough Magna-Tector was worked down to two joints above the drill collars at a depth of 12,200′ where it found the pipe to be free. It was necessary to pull maximum strain on the 2⅞" drill pipe to straighten out the crooks so the Magna-Tector would go down.

A String Shot Back-Off was fired at 12,200′ and the pipe was recovered from that point.

Both the McCullough Magna-Tector and String Shot Back-Off are long, thin tools. Their small diameters permit them to operate through any tool or pipe that has as little as a 2" fluid passage. In this instance these tools were worked through approximately 12,000′ of 2.026" I. D. drill pipe which had been bent and kinked by a 90′ drop.

Two Bulletins Available

1. No. 401 covers the McCullough Magna-Tector and String Shot Back-Off as individual tools.
2. No. 402 covers McCullough "One Trip Back-Off Service" featuring the great new combination of the Magna-Tector and String Shot Back-Off Tool.

Write to McCullough Tool Company, 5820 South Alameda Street, Los Angeles 58, California.

McCullough® TOOL COMPANY

Cable Address: MACTOOL

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HOUSTON
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INDIA — At Bombay's Santa Cruz Airport, a Caltex crew refuels one of TWA's sleek Constellations, a unit of the world's largest fleet of Connies and Super Constellations. Travelers depend on TWA for speed, comfort and safety... just as TWA calls on Caltex for fuels, lubricants and service that assure dependable engine performance and lower maintenance costs.

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Petroleum Products

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BAHRAIN — This modern service station is a busy "oasis" in the colorful Persian Gulf shaikhdom of Bahrain. Nearby, the Bapco refinery brings employment to many Bahrainis, assures a brighter economic future, produces petroleum products for markets halfway 'round the world.

ENGLAND — Big Ben is a familiar landmark in the world's largest city. Well known also is the lorry of the Regent Oil Company, Ltd. This Caltex affiliate in the United Kingdom supplies fine petroleum products so essential to progress.

Washington PIPE LINE

By Joseph B. Huttlinger

Oil Pipe Line To East Coast

The U. S. Office of Defense Mobilization may be near the end of its long study of ways and means to obtain up to one million barrels daily of additional oil pipe line capacity to the East Coast.

The ODM, after discarding a number of emergency steps to this end (stockpiling line pipe, for one), now has narrowed down the study to two applications from private enterprise to build the capacity if the government gives certain financial aids.

Texas Eastern Transmission Corp., Shreveport, La., plans to add a total of 875,000 barrels daily of capacity to the East Coast. A number of steps would be taken to obtain the capacity, the biggest single step being to convert Texas Eastern's Little Inch pipe line from natural gas to petroleum products.

A new line, loop lines and compressors would be constructed, so that all Texas Eastern's present gas customers could continue to have service. A part of the cost would come to as high as $120 million, Texas Eastern said, of which the government would do some of the financing. One source, fighting the Texas Eastern plan, said the overall cost could come as high as $363 million.

American Pipe Line Corp., New York, N. Y., plans to construct a new petroleum products pipe line from Port Neches, Texas to Pittsburgh, Penna., and then on to Newark, N. J. The line would carry 250,000 barrels daily to start, and 500,000 when manned by nine more pumps. The cost would be $195 million.

Both companies want help from the government in the form of rapid amortization of the cost of the projects for income tax purposes. In addition, both companies want the government to formally guarantee to repay bank loans made by the companies to finance the projects. In the case of American, the company is seeking a guarantee of part of the $100 million loan. In the case of Texas Eastern, the guarantee would be as much as is needed so that company can obtain three percent money for 35 years.

The two plans are competitive, so it is a case of one plan or the other and not both. Therefore, the companies appeared as rivals when they outlined their plans at a hearing before Dr. Arthur S. Flemming, director of the Office of Defense Mobilization on September 12. The hearing itself was "novel and experimental."

Clyde Hargrove testified for Texas Eastern, and Paul Ryan, chairman of the board of American, for his company. Both projects were criticized by Harold Leventhal, counsel for barge operators with investments of $25 million. "If there is a defense need for this line," he said, "the defense budget should pay the bill. As it is, these lines would put the barge people out of business, and it would be the barge people paying the bill. The government should not aid one form of business to the harm of another."

The ODM decision will set a precedent in many ways. For one, it would be the first time in peace that the government had guaranteed the financing of a private industry pipe line project. For another, it would be the entry of government into the competitive battle of transportation. For a third, the construction of overland, long distance pipe lines, as here projected, would have an important impact upon the whole structure of oil transportation.

The Military Petroleum Board, an industry group which made a major report to the government last March, now is making other studies at the request of the Departments of Defense and the Interior, it is disclosed.

The studies include "whether and how" the oil industry could meet specific demands for oil in the early days of any war. For the purposes of giving the answer, the MPAB is asked to assume certain amounts of bomb damage, the first calculations making such assumptions.

The MPAB studies, all of them due to be completed early next year, also cover "materials and manpower" needs, "availability of aviation gasoline and its components," and "a study on the availability of diesel fuel." The diesel fuel study is "particularly significant in connection with military research on engines for land equipment." The words are those of Dr. Arthur S. Flemming, director of the Office of Defense Mobilization.

Socal Vice President Appointed To Defense

Floyd S. Bryant, vice president of Standard Oil Co. (Calif.), has resigned to join the U. S. Department of Defense, it is announced. Secretary of Defense Charles E. Wilson said in a press release that Mr. Bryant will be his special assistant to determine how the sweeping reports of the Hoover Commission on Reorganization can be applied to the Department of Defense.

While there was no formal mention of it, Secretary Wilson is disturbed by the progress of the drive, both inside and outside of government, to slow down imports of crude petroleum and products to the U. S.

Mr. Bryant was born in Reno, Nev., and attended the University of Nevada and Stanford University and later became a Rhodes Scholar at Oxford.

He joined Standard Oil Company of California's land and lease division in 1922, and advanced to become a director and then vice president until joining the Department of Defense.

Anderson Named Head of Ventures Ltd.

Robert B. Anderson, former Texas oil executive and cabinet-level official, has become president of Ventures Ltd., a worldwide mining concern, operating in scores of countries and with scores of subsidiary and affiliated companies.

Thayer Lindsley, founder of Ventures Ltd. in 1928, made the announcement. He is to become chairman of the board, subject to approval of stockholders.

Mr. Anderson was manager of the W. T. Waggoner Estates near Vernon, Texas for 16 years. He became Secretary of the Navy under President Eisenhower in February 1953, and later Under-Secretary of Defense, a post which he resigned in August 1955.

Government Action Against the Petroleum Industry

An active antitrust program, involving the American petroleum industry, is being pressed in the courts this autumn, while other antitrust matters affecting oil are under study.

A case against the Sun Oil Co., first filed by the government on January 12, 1950, came to a new stage on October 10, 1955 when the defense opened its case in Philadelphia. The charge is that the company forced its dealers to handle Sun products exclusively, though without written contracts and papers to spell out this policy. Exclusive dealing, it is explained, is against the antitrust laws.

Another case against seven major companies on the West Coast, filed May 12, 1950, is still in the discovery phase, but the prospects are that it will be brought to trial in the coming year. The government charges the companies, the Standard Oil Co. (Calif.), and six others with conspiring to gain a monopoly in oil on the West Coast. As relief, the government wants the West Coast majors to get out of the marketing end entirely, and to dispose of all retail outlets.

Beyond this, the government has pending a case against the so-called "cartel" of major oil companies operating abroad. One of the most sweeping actions ever, this was filed April 21, 1953, and 60,000 documents have been collected as evidence. Just when, if ever, this one is to reach trial is to be seen.

A case accusing five majors of overcharging the U. S. Foreign Aid program for crude oil shortly after the war is pending in the U. S. District Court at New York. Recently, the Department of Justice issued a press release to state that Milo V. Olson, Los Angeles attorney, has been named to handle the government's case.

The government is moving ahead with its case against the Garden State Retail Gasoline Dealers Association, Newark, N. J. This case, filed May 12, 1955, in Newark, accuses the association and its officers of trying to fix the margins of markup that New Jersey gasoline dealers shall maintain. The association asked that the suit be dismissed as a local rather than national matter, but the court ruled otherwise.

The antitrust division says bluntly that it is considering other cases in the petroleum field, including price fixing between one or more majors and gasoline dealers. It is also studying the Interstate Oil Compact Commission to find out whether it works to hold up the price of crude oil, or merely to prevent waste. The department also is making studies of the foreign petroleum supply agreement.

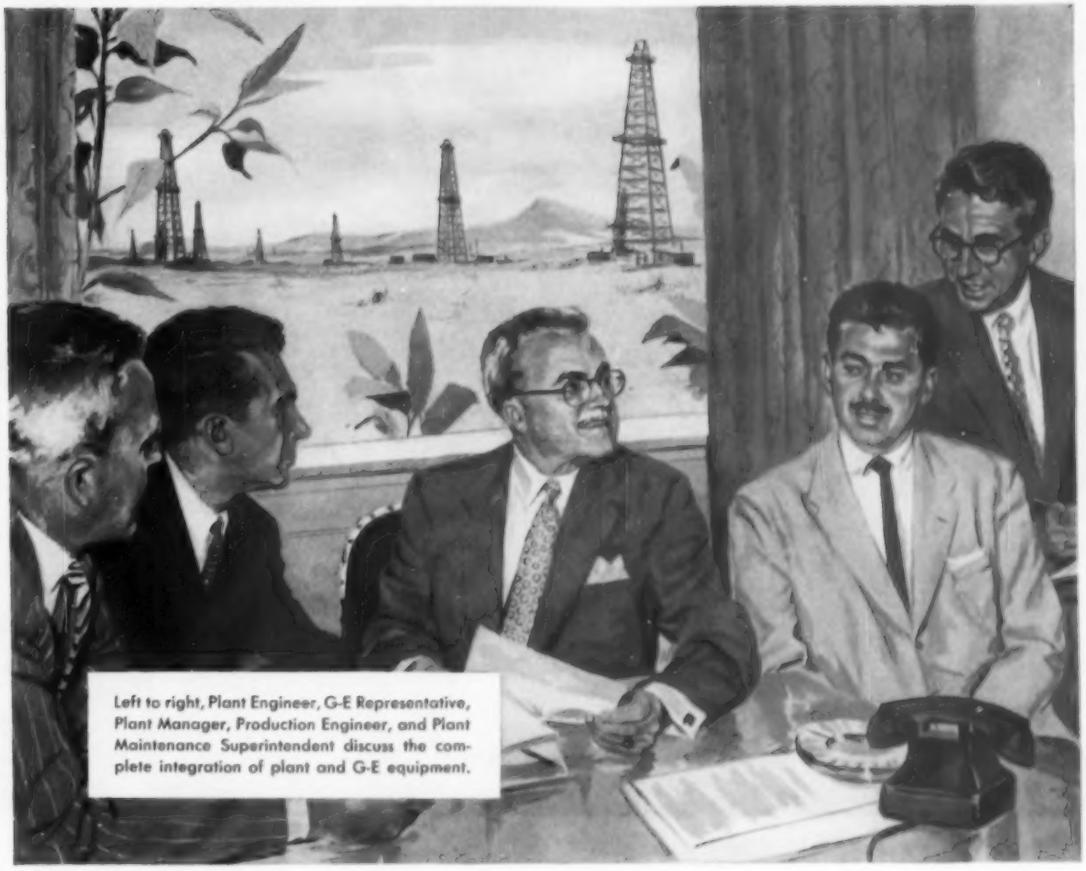
Meanwhile, Chairman Celler's House Judiciary Committee has been digging deeply into the operations of the National Petroleum Council. At times, his investigators spilled over into the American Petroleum Institute, and into oil executives who served the government during the Korean War without compensation. Full scale hearings were indicated in a Celler letter to H. A. Stewart, director of the Office of Oil and Gas of the Interior Department. Mr. Stewart was asked for scores of documents about the NPC, a group named by the Secretary of the Interior to advise the government.

Chairman Celler has been critical of petroleum in the past, and there is nothing to suggest that his current inquiry is anything more than a hunt for headlines and political prestige. At that, it is dangerous to the industry.

A new unit was ordered by Congress in the U. S. Department of Justice and will be set up by Stanley N. Barnes, Assistant Attorney General, to compile annual reports to Congress on the Interstate Oil Compact and whether it gets into price fixing.

Other reports will cover rubber plant disposal, small business, voluntary agreements, tankers and other matters.

Julius C. Renninger, a career lawyer with the antitrust division, has been named head of the new unit. He has a small staff to help him. As yet, Mr. Renninger said, the Department is still seeking the best way to get the facts about the Oil Compact and made its required report.



Left to right, Plant Engineer, G-E Representative, Plant Manager, Production Engineer, and Plant Maintenance Superintendent discuss the complete integration of plant and G-E equipment.

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Whether your interest is in the refinery or pipeline pumping, make sure that the equipment you select to do the job is the best available. Buying from one source . . . General Electric . . . provides outstanding applications of superior components, greater integration and the assurance of efficient, dependable service. When you specify G-E, you get quality performance.

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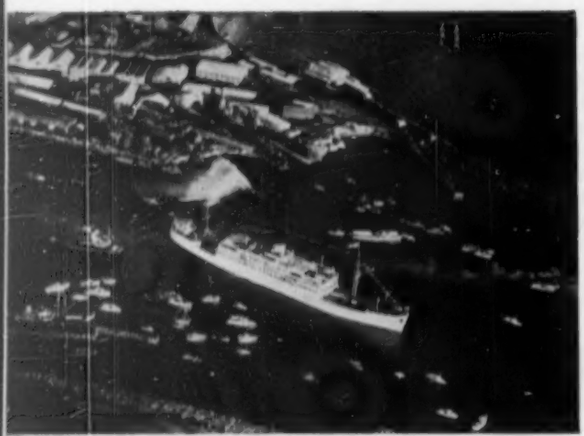


NEIGHBOR—*Only 17 miles from Kwinana is Fremantle, main port of Western Australia—a city which will grow as Kwinana grows.*

AS ENGINEERS and prime contractor for the Kwinana refinery in Western Australia, The M. W. Kellogg Company and Kellogg International Corporation are justifiably proud of their latest contribution to British Petroleum Company's global operations. But the opportunity to design and build this vast undertaking is attributable to the foresight of British Petroleum and the faith it has in Australia and especially the future of Western Australia.

We salute those who conceived Kwinana, as well as the various government authorities whose help made possible this important aid to the economy of Australia. With Kwinana in operation, this refinery alone is expected to meet well over 50% of the continent's requirements for refined petroleum products and, with existing refinery facilities, soon make Australia self-sufficient in this respect.

Full credit must be given also to Costain-John Brown, Kinnear Moodie, and D. & C. & Wm. Press, Ltd.—the British consortium known as the Kwinana Construction Group—and the Australian sub-contractors. These firms all cooperated with Kellogg International Corporation to build the Kwinana refinery.

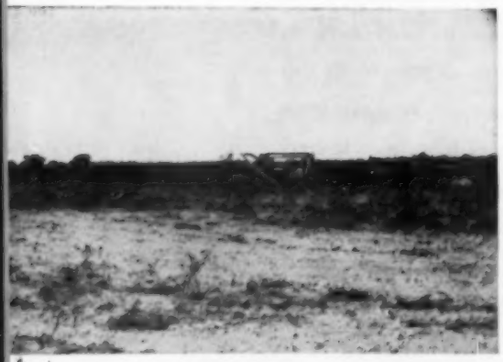
To the thousands of men who participated in getting Kwinana on stream ahead of schedule, the M. W. Kellogg Company says "many thanks for a job well done".

THE M. W. KELLOGG COMPANY, NEW YORK 7, N. Y.
KELLOGG INTERNATIONAL CORPORATION, LONDON
Subsidiaries of Pullman Incorporated

THE NEW—*One town born of Kwinana is Medina. Photograph shows houses as they were being erected for workers at the refinery.*

THE OLD—*Perth, capital of Western Australia, not far from Kwinana, already benefits from its new neighbor.*

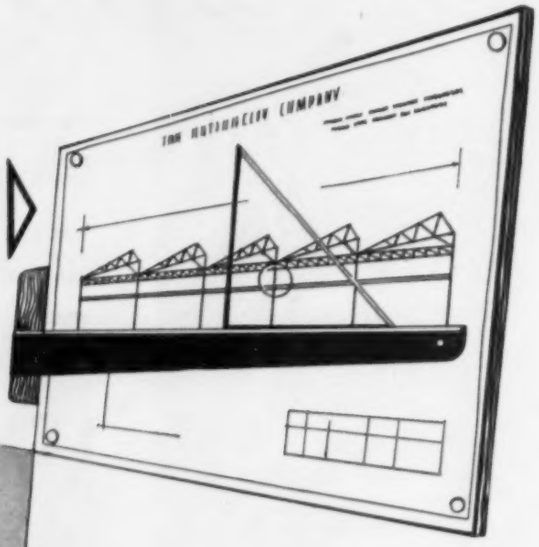
helps a Continent grow



BEFORE—*This was Kwinana about two years ago.*

TODAY—*Lights twinkle at Kwinana as the refinery goes on stream at the rate of 22,000,000 U. S. barrels annually.*

from drawing board



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CS-37

whence Kwinana?

June, 1921 . . . deep winter in southern latitudes. The freighter *Kwinana* was driven by an unprecedented gale on to the beach in Cockburn Sound.

Thirty-one years after the disaster, the bush gave way before machines, and a refinery started taking shape. By 1956 the new enterprise will be treating 3,000,000 tons of petroleum products a year. Lofty steel columns overshadow the rusted iron hulk on the shore; but the old ship's name rings round the world.

Kwinana Refinery was designed by the M.W. Kellogg Company and their British subsidiary, the Kellogg International Corporation, for Australasian Petroleum Refinery Limited, an associate of the British Petroleum Co. Ltd. Actual construction of the £A40,000,000 project was entrusted to a consortium of three British contractors known as the Kwinana Construction Group. One member of the consortium is D. & C. and William Press Limited.

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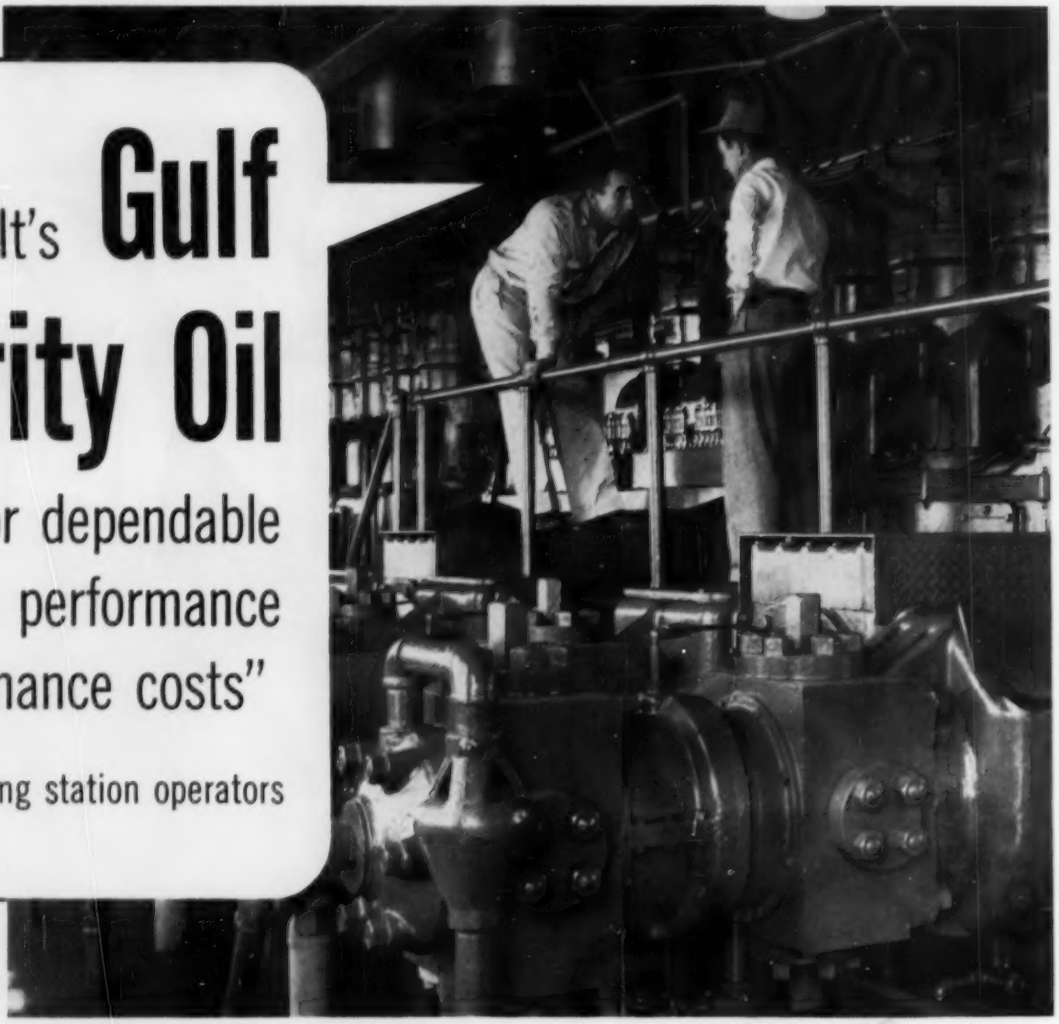
"It's Gulf Security Oil for dependable gas compressor performance and low maintenance costs"

say pumping station operators



Smooth, continuous operation is a must for these units in service at a South Texas gas compressor plant. They are responsible for the steady flow of essential natural gas through pipe lines to homes and industries as far north as Detroit and New York. Gulf Security Oil provides the sure, effective protection needed for cylinders and bearings in both engines and compressors.

You can depend on Gulf Security Oil to provide the proper lubrication that is so important to vital compressor units if operating troubles are to be prevented and maintenance costs kept low.

Gulf Security Oil has a record of outstanding performance in scores of gas transmission plants. After years of operation with this quality oil, the cylinders and piston rings of both the compressors and power assemblies show negligible wear. And few carbon deposits have formed on power cylinder ports and pistons.

If you are installing new compressor units, or feel that you're not getting the most effective lubrication possible for your present units, it will certainly pay you to try Gulf Security Oil. Contact your nearest Gulf Office and have a Gulf Sales Engineer call.

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Every Size and Type—In this new shop we are working with all of the 300 or 400 series of alloys, clad steels and aluminum; and are fabricating such products as pressure vessels, tanks, towers, troughs, autoclaves, reactors, hoppers, kettles, platework and machinery. All sizes and types are handled; and pieces too long for delivery by rail can be shipped direct by water from our own docks on the Delaware.

Every Facility—The new shop is an integral part of Sun Ship's huge plant at Chester, Pa.—an impressive blend of steel fabricating shops, forge shops, boiler and tank shops, machine shops and every other facility needed for building the many types of made-to-order equipment required for modern industry.

For more specific information about our new Alloy Products Shop, for estimate, advice or a representative's personal call, just get in touch with our Sales Engineering Department. Your inquiry will receive prompt and expert attention.

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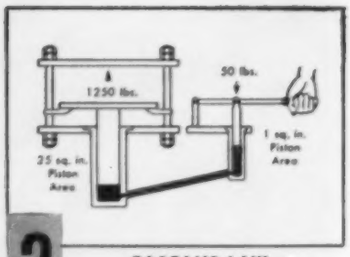
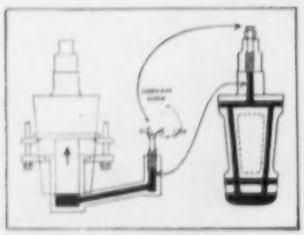
Here's Why AUDCO-NORDSTROM Valves Close So Tightly, Yet Operate So Easily

1 Audco-Nordstrom valves use the basic scientific principle known as Pascal's law, which says that "pressure applied to a confined fluid is transmitted uniformly to all areas of the confining surfaces."



2 PASCAL'S LAW

Here's an example showing how 50 pounds pressure on 1 square inch is sufficient to lift 1250 pounds when transmitted to a piston of 25 square inches.



3 In Audco-Nordstrom valves, the lubricant screw applies the pressure to force lubricant through the grooves of the plug and give a powerful jacking action to lift the plug off the seat and keep the valve easy to turn at all times.

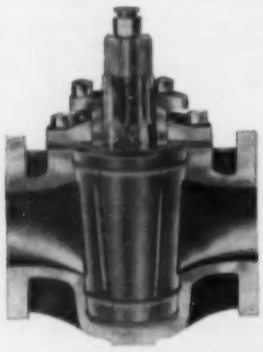
4

The grooves in the plug and body also distribute a film of lubricant across the seating surface, further sealing the valve ports against leakage, even in services where the line is carrying hard-to-hold fluids, vapors and gases.

5 If necessary, the plug can be instantly freed by a "shot" of lubricant from a pressure gun or by turning the valve lubricant screw. Operation is always easy because it's lubricated.

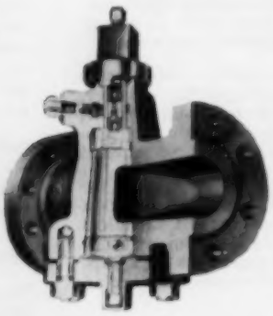
6 It takes only a quarter-turn of the plug of an Audco-Nordstrom valve to change it from fully open position to completely closed—one-tenth the time it takes to operate many valves.

7



There is a size and type of Audco-Nordstrom valves for nearly every service. Here's one with flanged ends and bolted gland. Screwed end or screwed gland patterns are also available.

8



This is the Hypreseal type of Audco-Nordstrom valve for higher pressure services. Audco-Nordstrom valves are also built with gear or power operation. Available in rectangular or full round opening. There are proper lubricants for almost every service, too.

Consult your representative

AUDCO and NORDSTROM

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EXPORT: International Department Rockwell Manufacturing Co. 400 N. Lexington Ave., Pittsburgh 8, Pa. Distributors throughout the world.

CANADIAN VALVE LICENSEE: Peacock Brothers Limited, Montreal, Que.

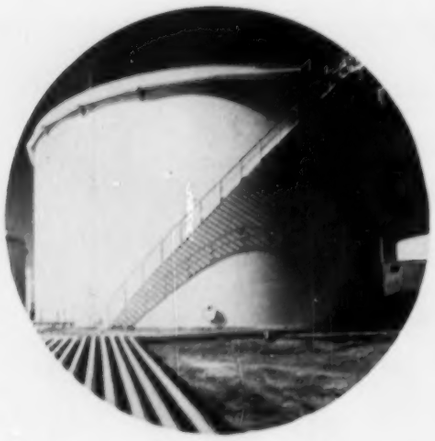
"The oil industry has prospered by creating wealth that did not exist before. By the application and investment of capital and brains and ability it has produced oil from the earth — in some places in the middle of desert wastes, in other places under water. Where there was nothing, it found a valuable raw material. It has created wealth, and nobody has lost any money or given up any of his rights."

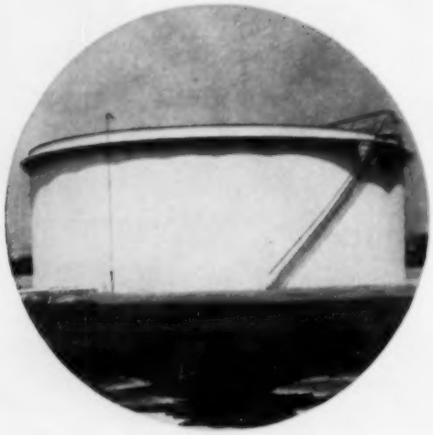
—From an address by Eugene Holman, Chairman of the Board, Standard Oil Company (New Jersey)

Esso

STANDARD OIL COMPANY (NEW JERSEY)

AND AFFILIATED COMPANIES





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The Wiggins roof floats on the surface of a stored product and the triple seal protection turns practically all pumping and standing losses into savings. Simple design keeps maintenance low. Tested and approved under all weather conditions.

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There was a time when Graver built tanks for storage of crude. That was 96 years ago when oil was first discovered. Graver still builds tanks for crude storage—and also for storing gasoline, kerosene, LP-gas and many other volatile liquids. Just recently Graver precision-fabricated a flock of large underground tanks for jet fuel storage. They will withstand a working pressure of 60 psi.

Whatever your storage problems, call on us. We have undoubtedly solved similar ones before.

CLASSIFIED! Pictured is one of 35 tanks which will be buried in the ground at an undisclosed site. Each tank holds in excess of 50,000 gallons.

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SHELL REPORTS

A PICTURE ROUNDUP OF SOME ACTIVITIES THAT MADE NEWS OUTSIDE THE PETROLEUM WORLD

PIPE RIDE. Poling for submerged roots, this oil "gondolier" rides one-mile sections of the Norco-to-Baton Rouge pipeline through 11 miles of mushy cypress swamp. Pipe lengths are welded on broad wooden islands in the swamp and then floated forward slowly through dense, snake-infested undergrowth. Now "on-stream," the new Louisiana line will help Shell speed more products to market for everybody.

SQUEEZE PLAY. This new lift truck developed by Shell grabs loads by the sides instead of lifting from below. With selected control pressures, it totes drums, cartons, rolls, bales and barrels—safely and quickly. This new technique reduces the cost of frequent package transfer, and helps Shell keep the cost of petroleum products down.

FULL HOUSE. Since 1939, forty-one foster children have lived and laughed and been loved in the home of "Mom" and "Pop" Craig. Because their own four daughters were at college or faraway jobs, the Allen Craigs opened their home to a parade of less fortunate children. Today Al is retired after 28 years with Shell. But the Craigs are still on active duty as foster parents in their home at Meiners Oaks, California—and loving every minute of it. Their 25 years of kindness in the troubled lives of 41 young people makes Shell proud of its long association with two wonderful people—"Mom" and "Pop" Craig.

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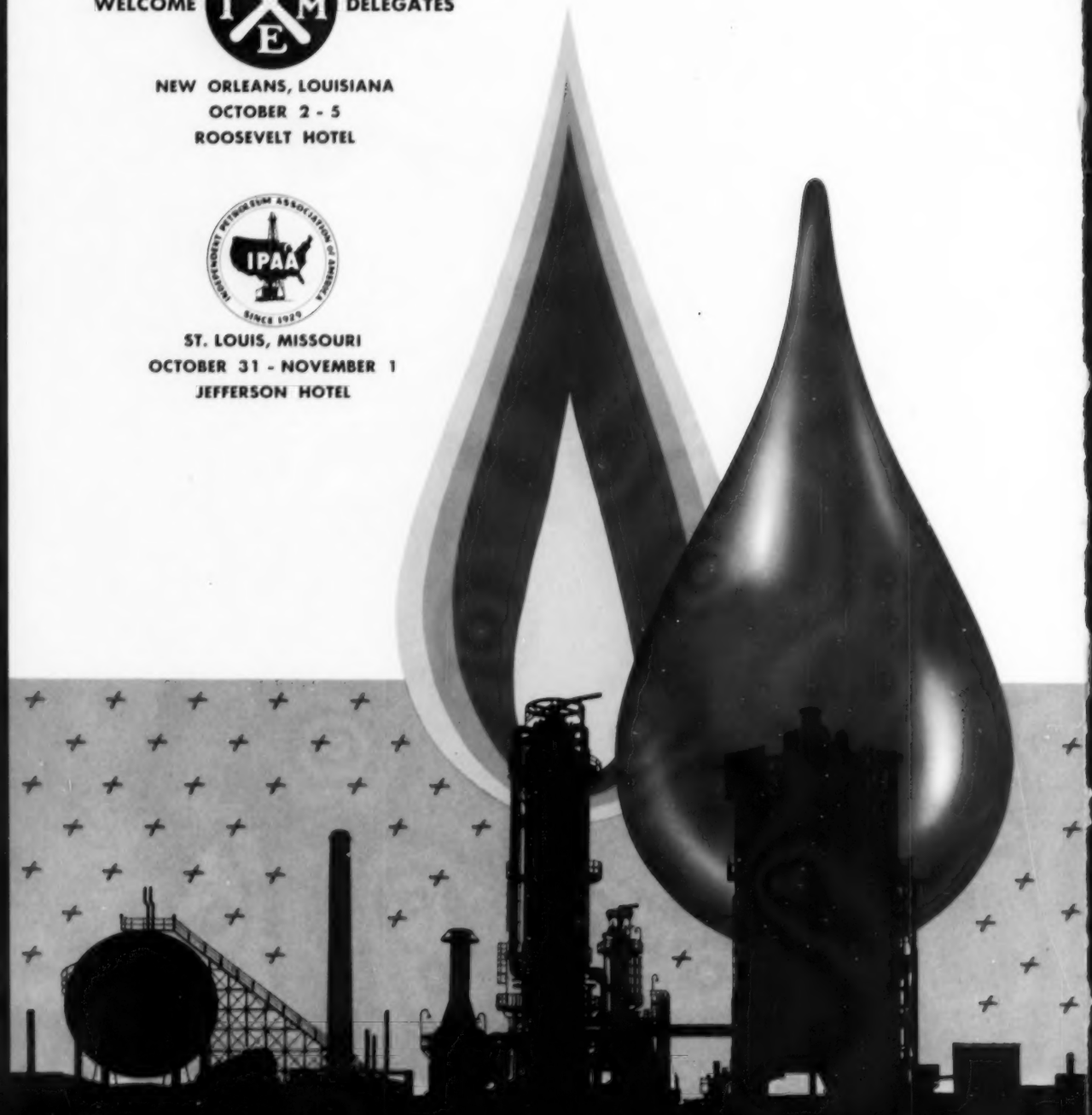
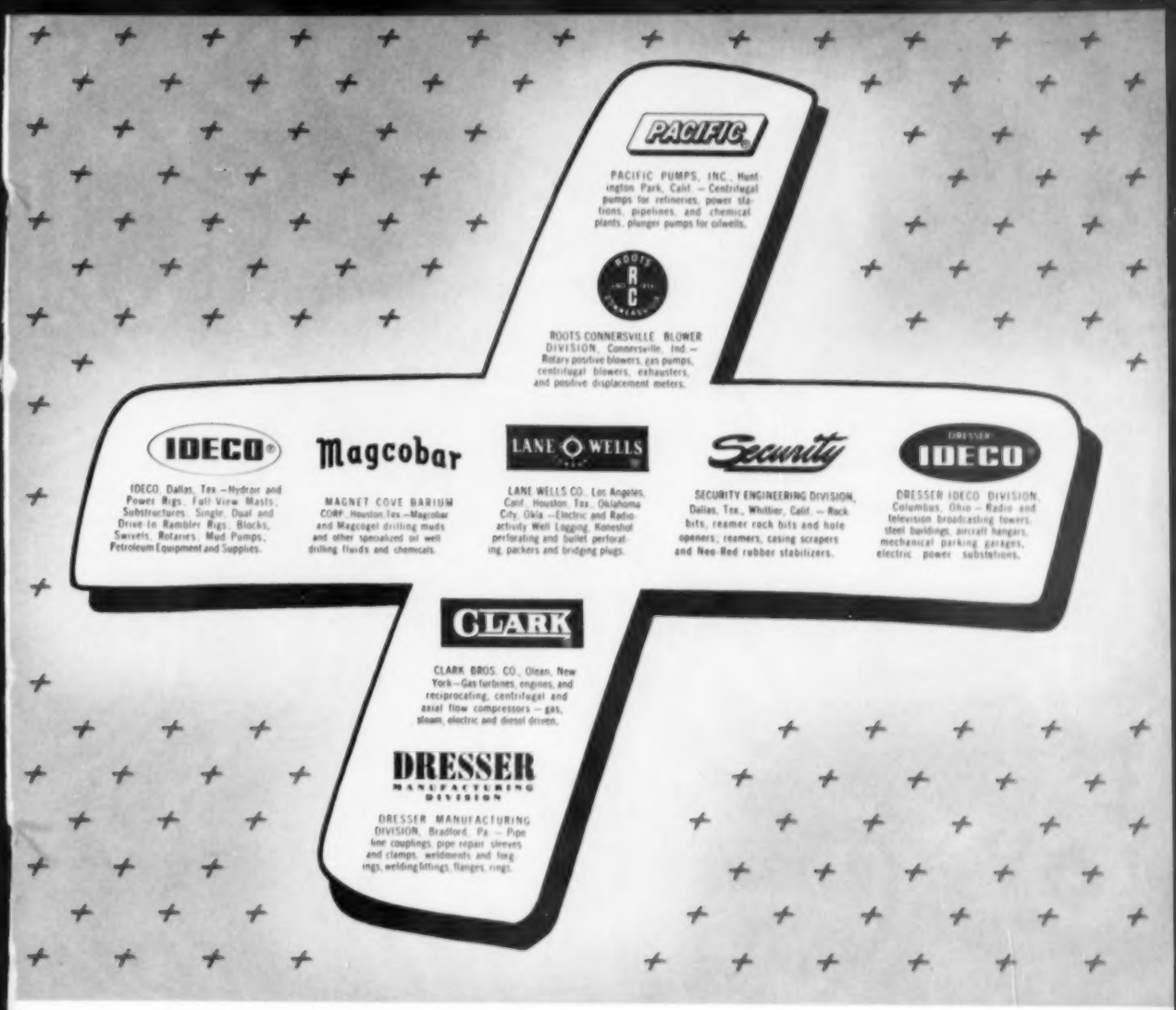
IPAA

ST. LOUIS, MISSOURI
OCTOBER 31 - NOVEMBER 1
JEFFERSON HOTEL



OIL AND GAS–BASIC ENERGY FOR AMERICAN PROGRESS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PACIFIC PUMPS, INC., Huntington Park, Calif. — Centrifugal pumps for refineries, power stations, pipelines and chemical plants, plunger pumps for oilwells.
ROOTS CONNERSVILLE BLOWER DIVISION, Connersville, Ind. — Rotary positive blowers, gas pumps, centrifugal blowers, exhausters, and positive displacement meters.
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SECURITY ENGINEERING DIVISION, Dallas, Tex., Whittier, Calif. — Rock bits, reamer rock bits and hole openers; reamers, casing scrapers and Neo-Red rubber stabilizers.
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DRESSER IDECO DIVISION, Columbus, Ohio — Radio and television broadcasting towers, steel buildings, aircraft hangars, mechanical parking garages, electric power substations.
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DRESSER MANUFACTURING DIVISION
DRESSER MANUFACTURING DIVISION, Bradford, Pa. — Pipe line couplings, pipe repair sleeves and clamps, weldments and forgings, welding fittings, flanges, rings.

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Dresser pays tribute to the many achievements of the great oil, gas and chemical industries . . . achievements that call for increasingly high standards in field and plant equipment and services. Always striving to pace these exacting demands, Dresser constantly amplifies the Dresser Plus+ wherever and whenever possible. No other single company provides the same broad range of superior products and services. Dresser equipment and services are the standard of comparison . . . the world over!

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BASIC EQUIPMENT FOR THE OIL AND GAS INDUSTRIES

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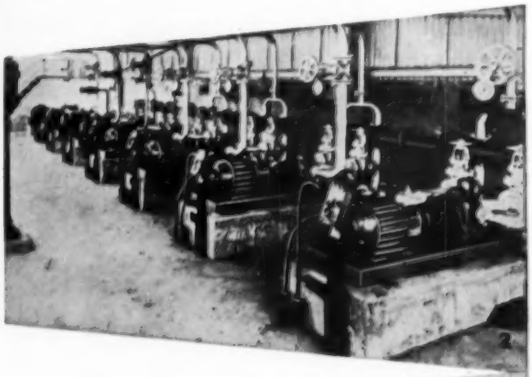
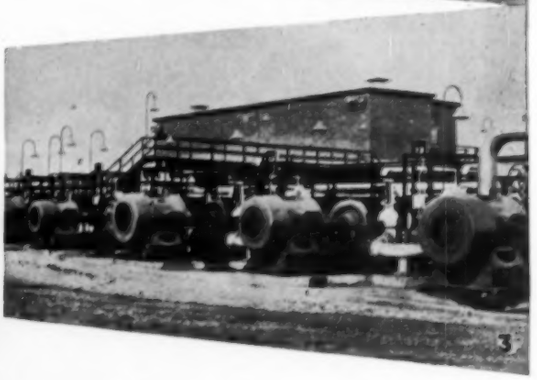
FLAMEPROOF MOTORS

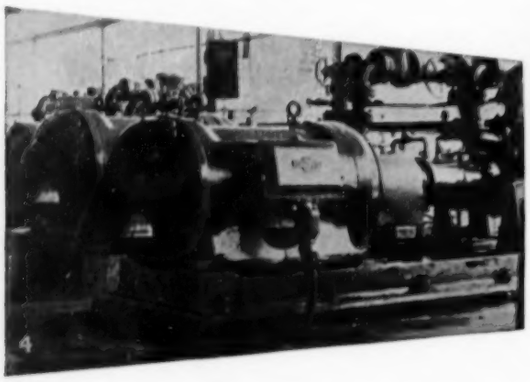
certified for group 2 and group 3 gases

A complete range of Metrovick Buxton-certified flameproof motors is available for refineries and petro-chemical works, for either indoor or outdoor use. Machines with either ball and roller bearings, or sleeve bearings, can be supplied, and all are suitable for hot product pumps.

A specialised range of splash-proof well-pump motors and industrial type machines for non-hazardous locations is also available.







1. A range of flameproof motors in one of the main pumping stations at Scottish Oils, Grangemouth Refinery. 2. Type KFB flameproof motors driving Sigmund pumps at Shell Stanlow Refinery. 3. 300-600 hp outdoor flameproof motors at the product loading station at Esso Refinery, Fawley. 4. 125 hp 3500 rpm T.E.F.C. motors driving oil pumps at Trinidad Leaseholds Pointe-a-Pierre Refinery, British West Indies.

METROPOLITAN-VICKERS

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J/M301

HR... casts a deeper shadow than we thought!

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A year ago HR was a new seismic tool . . . the system's filters, extremely rapid AGC rate and its fast paper drive were especially designed for recording high frequency energy. We were cautious. We set the effectiveness of HR at a depth range of from 100 to 2500 feet.

Now, GSI experience has proved that HR not only operates effectively within that range, but can also supply *the resolving power needed for solving structural and stratigraphic problems at depths of 5000 feet and greater.*

GSI experience with HR in Oklahoma, Kansas, Colorado, California, Canada and Texas has proved that HR greatly exceeds our hopes. In some areas, HR has produced reliable results from 6000 to 8000 feet.

Contact GSI . . . the geophysical contractor best qualified in applying this new tool to oil finding. We shall be happy to have a representative call and discuss HR with you.

Write for Bulletin 55-3 on application of the HR System.

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5900 LEMMON AVENUE · DALLAS 9, TEXAS

Finding a World of Oil for a Quarter-Century

A Good Turn For Motorists

Most people consider a car the second-biggest purchase they'll ever make. Anything that extends its life or improves performance naturally contributes to your pocketbook as well as your motoring pleasure. Since our new "Detergent-Action" Gasolines do both, they're prime examples of Standard's planning for you.

Standard has built 4 catalytic reformers in the West to make these cleaner-burning, more powerful motor fuels required for best performance of today's higher compression engines. This program was two years in planning and building—cost $50 million.

This $50 million worth of plants is only part of the $350 million Standard is investing this year to make petroleum more useful and plentiful. Some of it will go for product research, part will pay for new manufacturing facilities. A good share will finance the search for new sources of oil to help supply the 733 gallons a year per person that go into thousands of oil-born products essential to modern living.

So the $350 million is an investment in your future as well as ours. It's one way Standard helps guarantee there'll be plenty of oil to do more jobs today and in the years to come.

STANDARD OIL COMPANY OF CALIFORNIA
plans ahead to serve you better

FLUID HYDROFORMER

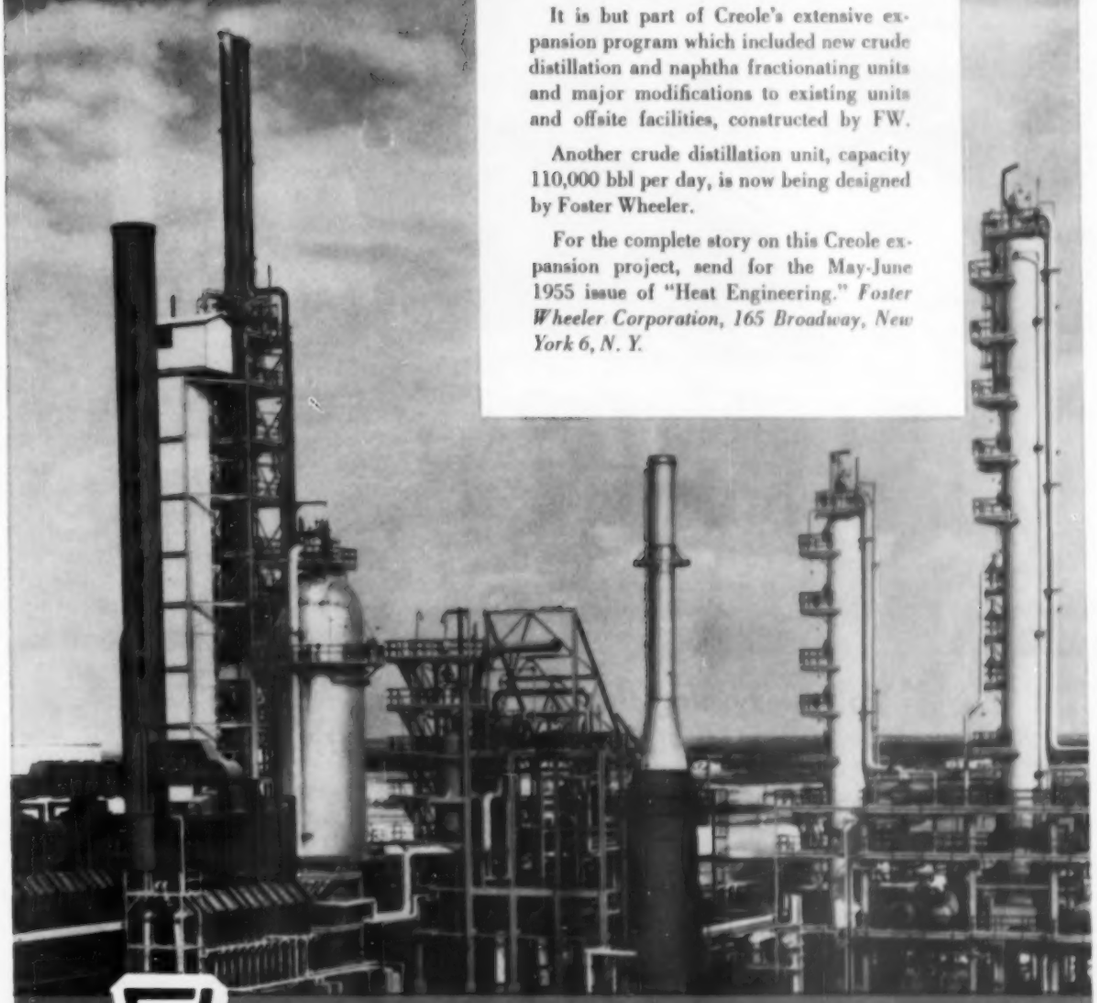
features expansion program at CREOLE'S Amuay Bay Refinery

BUILT by Foster Wheeler, this new 10,000 bbl per day Fluid Hydroforming unit is now "on stream."

It is but part of Creole's extensive expansion program which included new crude distillation and naphtha fractionating units and major modifications to existing units and offsite facilities, constructed by FW.

Another crude distillation unit, capacity 110,000 bbl per day, is now being designed by Foster Wheeler.

For the complete story on this Creole expansion project, send for the May-June 1955 issue of "Heat Engineering." *Foster Wheeler Corporation, 165 Broadway, New York 6, N. Y.*



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PROTECTION for the wheels that make the world go 'round!

For everything that runs, there is a correct Flying Red Horse Lubricant!

THOUSANDS of years ago some obscure genius invented the wheel. With it he made possible most of today's mechanical marvels—and at the same time created a need—*Lubrication!*

This need has become so vital over the centuries that today transportation and industry could not function without lubricants and lubrication knowledge. The Socony Mobil Oil Company is a leader in this specialized field.

For over 89 years Socony Mobil has met the lubrication requirements of pioneers in many fields. Aviation's Wright Brothers . . . early car makers . . . the inventor of the Diesel engine are only a few who have called on the Flying Red Horse for specialized lubricants.

Today, new developments such as atomic power, jet engines and gas turbines pose new and complex lubrication problems. Socony Mobil Oil is proud that it's being called on to solve these problems and plans to continue to devote its facilities and products to keeping the wheels of the world moving.

The Leader in Lubrication for nearly a Century!

SOCONY MOBIL OIL COMPANY, INC.

■ Everywhere the new Westinghouse type G frame-mounted oil circuit breaker has been installed, it has received the enthusiastic approval of the maintenance department. Why? Because here is a power breaker designed to put maintenance costs where they belong—at rock bottom.

For example, the pole unit lever assembly has been located *inside* the tank top . . . leaving a smooth, easy-to-clean and easy-to-paint exterior surface. Solder-seal condenser bushings provide high mechanical strength and uniform voltage stress . . . and are manufactured to new ASA standards for ready interchangeability. And Westinghouse-developed De-ion Grid Arc Control helps lower maintenance costs by reducing contact burning and oil deterioration.

Of course, operation has not been overlooked, either. Improved De-ion Grids . . . power factor test taps . . . multi-ratio-type bushing current transformers with *Hipersil* cores—these are just a few of the features.

The new Westinghouse type G breaker is available in ratings from 14.4 to 69 kv. For the full story of how it can serve *you*, please write to me on your company letterhead for a free copy of booklet DBW-33-252.

J. H. Smith, *Supervisor*
Switchgear Section

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Industry is finding the answer to dependability... in the sky!

More and more the communication facilities that help run American industry are moving "upstairs"... free from the hazards of blizzards, hurricanes, floods, and fires... the high cost of repair and replacement... the loss that goes with every crippling storm.

The virtually indestructible chains of miles-apart towers that provide industry with microwave circuit pathways in the sky are matched by the *quality* of their service ... the versatility, flexibility, and dependability of multiplex and RF elements in a well engineered microwave system.

Federal Microwave equipment ranks at the top on all these points. It is microwave at its simplest and best... incorporating the techniques and design features developed in many countries by microwave specialists of International Telephone and Telegraph Corporation... *first* to bring commercial microwave to the world!

The records of high reliability achieved by *Federal* Microwave in all-purpose industrial communication is proof that today's soundest microwave investment is the system that's *"Certified by a World of Research!"*

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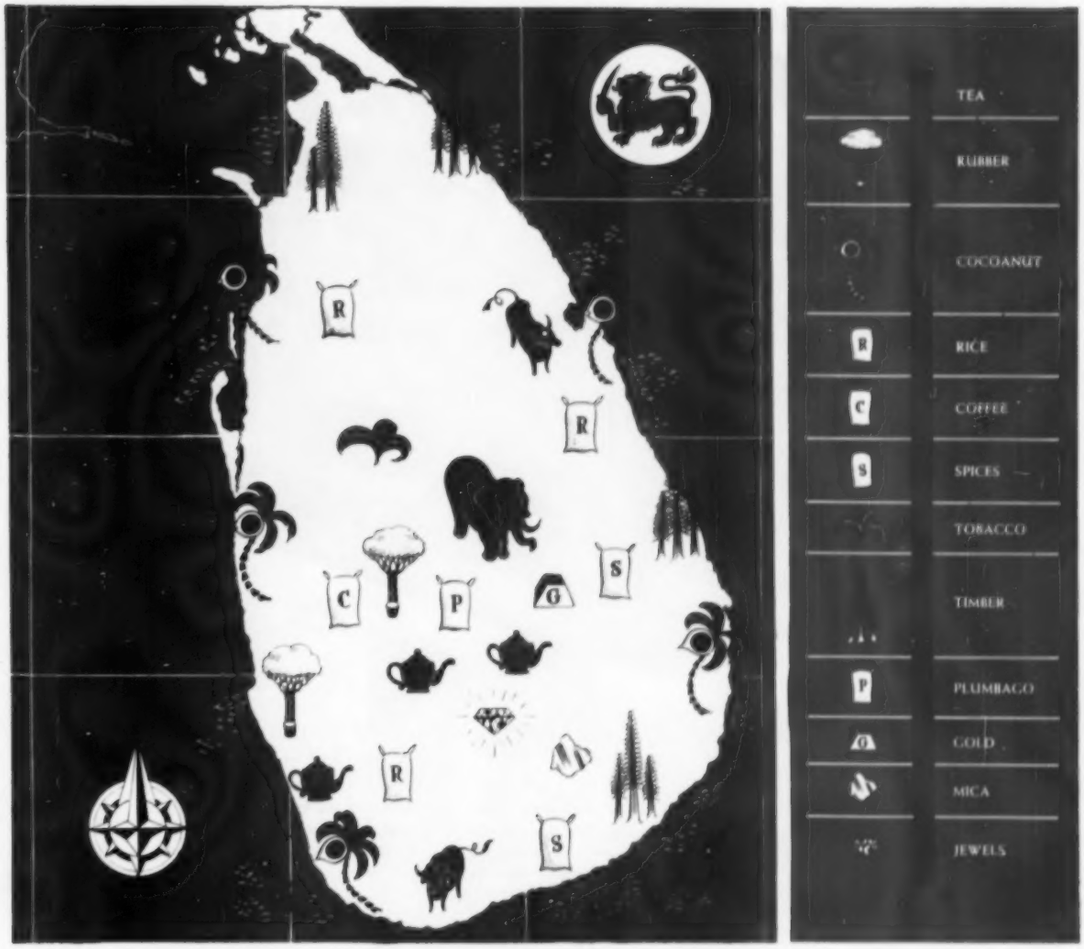

DOMINION OF CEYLON

CEYLON . . . Bright gem in the Indian Ocean, this delightful island has long been admired for its scenery . . . its climate . . . its ancient temples. Ceylon's tea plantations are world-famous . . . its 25,000 square miles of fertile land also yield abundant rubber, cocoanut products, rice, coffee, spices, tobacco and timber . . . its minerals include plumbago, mica, gold and semi-precious jewels. Numbered among important post-war industrial developments in Ceylon are hydro-electric and irrigation projects, steel rolling mills, paper and fertilizer manufacture . . . as well as the expansion and modernization of other industries. Ceylon's 7 million people face the future with confidence.

Standard-Vacuum is proud of the part it plays in supplying the petroleum products so essential to the welfare and continued growth of Ceylon.

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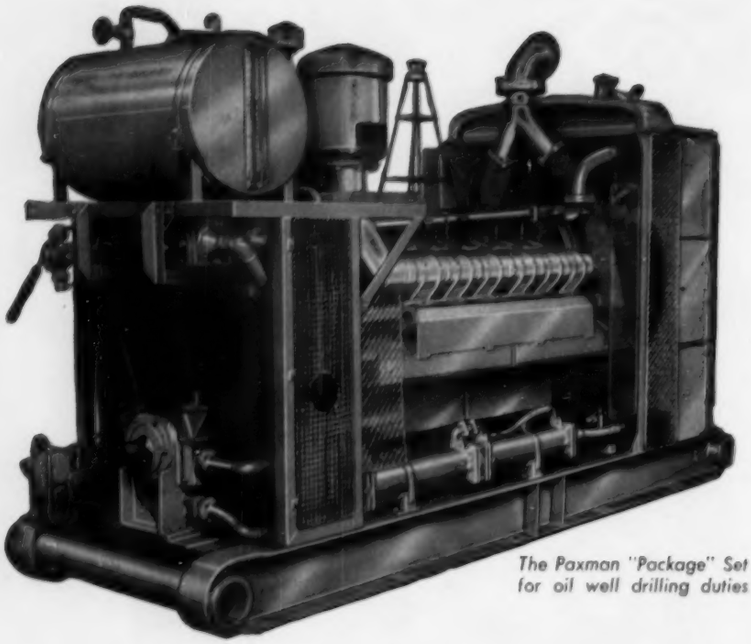

The Paxman "Package" Set for oil well drilling duties

packed with power

Those engaged in the tough, arduous work of oil well drilling think highly of the Paxman "Package" Set. They like it for its sufferance of rough handling, its ability to keep going under any conditions and its adaptability for almost any type of drilling rig. Paxman Package Sets are available with a horsepower range of 130-665 s.h.p. at the output shaft.

PAXMAN *diesel engines for oil well drilling*

DAVEY, PAXMAN & COMPANY LIMITED COLCHESTER *(ASSOCIATED WITH RUSTON & HORNSBY LTD. LINCOLN)*

PETROLEUM CHEMICALS DIVISION
NEWS

October ★ One of a Series of Interest to the Petroleum Industry ★ 1955

A symbol of SERVICE in every community

To the American motorist, the words "petroleum products" and "service" have become almost synonymous.

But the typical American service station stands for more than just automotive service. It stands for *service to the community*, too . . . because the man who operates the station is a *good neighbor*, the kind of man you can count on to take an active part in civic, church and club affairs. And behind the service stations are the thousands of oil company employees and distributors who work together – not just during Oil Progress Week – but 52 weeks a year to make oil progress an important part of the over-all progress of our whole American community.

A PORTRAIT OF PROGRESS

"Speak to the Earth" is a book about oil and oil people

"A new and refreshing book about oil . . . the growth of a great industry in terms of human endeavor and almost super-human achievement!"

We think you'll agree with this statement, too, after you have read "Speak to the Earth," the new book covering the oil industry by Max Miller, well-known author of "I Cover the Waterfront" and 22 other books. The book explains exploration, drilling, production, transportation, refining and marketing, in an easy-going, realistic, yet entertaining style.

Max Miller was retained by the Du Pont Company to write the story. And to help promote a better understanding of the oil industry, the book is now being made available to the public at book stores by its publisher, Appleton-Century-Crofts, Inc.

New survey studies dealer knowledge of product quality and sales assets

That old familiar phrase, "know your product," is still a cardinal rule of good selling. And since your service station dealers are your main link with the motoring public, their knowledge of your product features can have a mighty important bearing on your own sales volume.

But how much does the average service station dealer really know about the products he sells? To help you answer this question accurately and statistically, Report No. 2 of the new Du Pont survey on "The Service Station Operator" is now ready for distribution to oil company marketing executives. Here is a quick preview of the type of information it contains.

HOW MUCH do dealers know about the additives in the gasolines they sell? This new Du Pont survey can help you answer this question.

The report discusses the dealer's knowledge of the products he sells, including his knowledge of additives and their functions, his opinion of what his greatest gasoline sales assets are, and his knowledge of gasoline pricing.

"What's the difference?"

Our researchers asked this question in regard to the difference between "regular" and "premium" grades. Two-thirds of the dealers mentioned *octane number* as the chief difference. And many of them answered in terms of customer benefits – such as power and pick-up, antiknock, starting and warm-up qualities, and mileage.

But what about brand differences? The dealers' answers to this question may be quite significant—although not as encouraging. Nearly two-thirds of the dealers said they felt the premium gasolines sold by the major oil companies were pretty much the same . . . and more than two-thirds felt that the regular gasolines were pretty much the same, too. But of those who felt there was a difference, two-thirds said their own brand was superior.

The survey also documents the dealers' knowledge of motor oil quality. In this respect it is interesting to note that,

ADVERTISEMENT—Prepared for the Petroleum Chemicals Division of E. I. du Pont de Nemours & Company (Inc.)

OVER

PETROLEUM CHEMICALS DIVISION
NEWS

CONTINUED

Dealer Survey

when discussing the difference between grades of oil, more than half of the dealers mentioned the *detergency* of the oil.

Other factors

The dealers' knowledge of the additive content of the petroleum products they sell was also probed . . . as was their knowledge of prices in their local marketing area. And the survey included questions about tires, batteries and such services as chassis lubrication and automatic transmission service.

Their own sales assets

To the question, "What do you consider your greatest sales asset?" the dealers returned a wide variety of answers. You'll probably find this page the most interesting and significant in the whole report. It includes the dealers' own relative ratings of such factors as brand, station location and hours, advertising, service, friendship, and many more.

Regional breakdowns

Although the dealer survey is nationwide in scope, it is broken down regionally according to the four main marketing areas of the country. Because of this, it will be extremely helpful to regional as well as national marketers.

Sponsored by Du Pont, the survey was conducted by National Analysts, Inc., on a completely impartial basis. The results are being published in a series of five reports. The first covers station hours and rush periods, gallonage sold, customer credit, and the use of customer mailing lists.

Now available

Both Reports No. 1 and 2 are now available to marketing executives through any of our regional offices listed below. The remaining three reports will be issued periodically during the next six months.

Continuing market research

This survey on "The Service Station Operator" is part of the continuing market research work of the Du Pont Petroleum Chemicals Division. Another part of this program is the Du Pont survey of service station customer buying habits.

CENTRAL REGION LAB MANAGER

ARTHUR R. KERNEN joined the Du Pont Company in 1947 after receiving his M.S. degree in chemistry at the University of Delaware.

His first assignment was as a research chemist at the Du Pont Petroleum Laboratory. Following this he did both development and sales-service work on gasoline additives and stability problems.

In September, 1953 he was appointed manager of the Petroleum Chemicals Division's Central Region laboratory in Chicago. He is in charge of customer service in product testing and analysis and additives treating recommendations.

Before beginning his graduate work, he received a B.S. degree at the University of Notre Dame. He also attended Xavier University in Cincinnati, Ohio.

ARTHUR R. KERNEN

Mr. Kernen is a member of the Society of Automotive Engineers and the American Chemical Society.

Du Pont's Fuel-Injection Test Car Hits the Road

In view of the possibility that many automobiles will soon be equipped with fuel-injection engines, a special fuel-injection system was added to a Lincoln car at the Du Pont Petroleum Laboratory in 1954. The purpose of this car is to study the possible advantages of fuel injection to the refining industry.

From testing a variety of gasoline blends in the fuel-injection engine, it has been found that fuel-injection permits greater flexibility in blending fuels. Higher vapor pressures can be used, and it is possible that increases in end point might be practical. These wider tolerances could mean a substantial benefit to refiners and the motoring public.

The car has a standard Lincoln V-8 engine to which has been added an American Bosch fuel-injection system and special instrumentation. The system gives freedom from carburetor icing, relief from vapor lock troubles, improved power, and permits styling changes since the hood lines can be lowered with the less bulky fuel-injection pump.

For studying the performance of different gasolines in the fuel-injection engine, the Petroleum Laboratory has tested the car on the laboratory's chassis dynamometer. The Petroleum Chemicals Division has also made plans for the car to make a demonstration tour.

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Petroleum Chemicals

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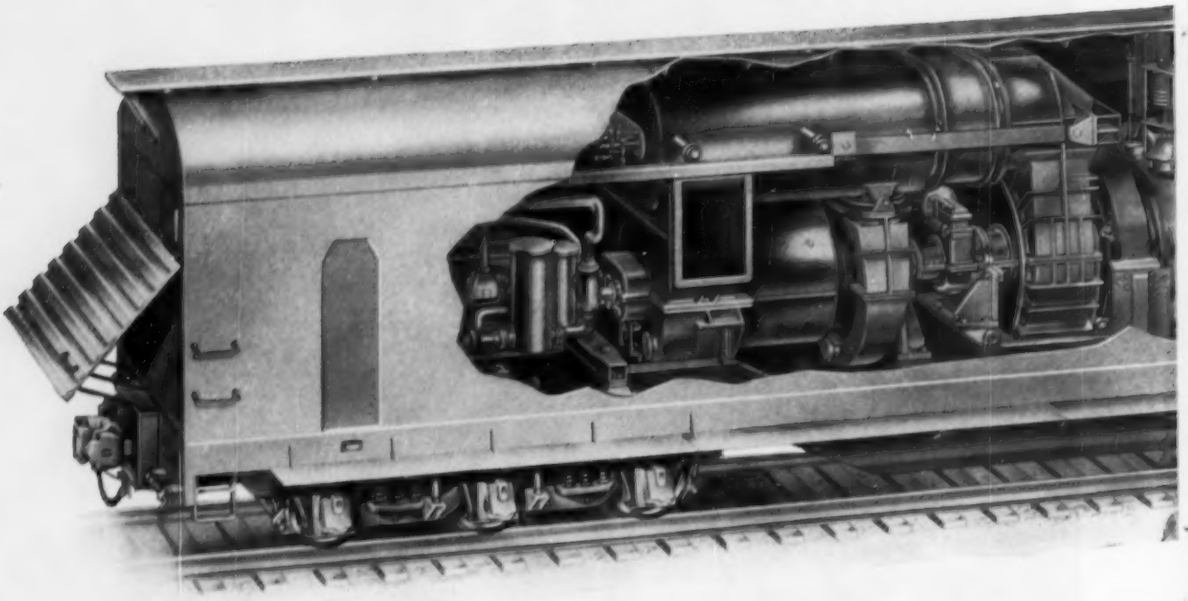

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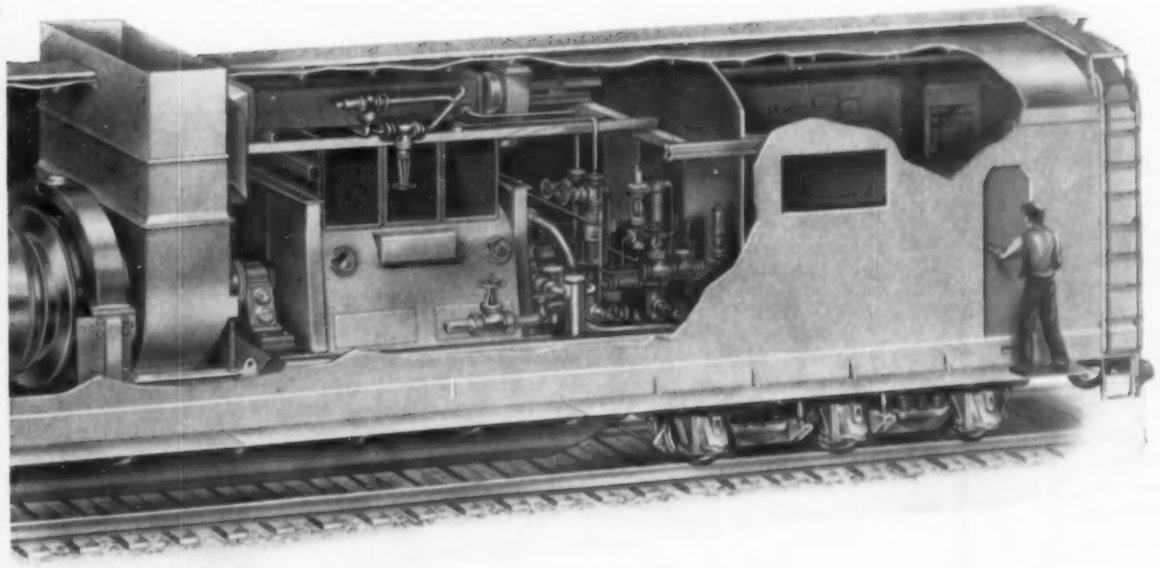

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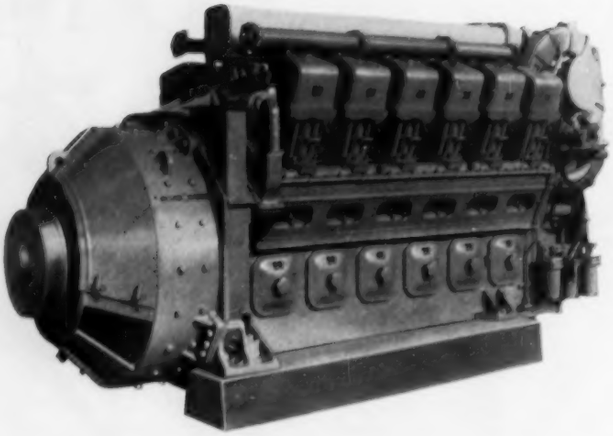

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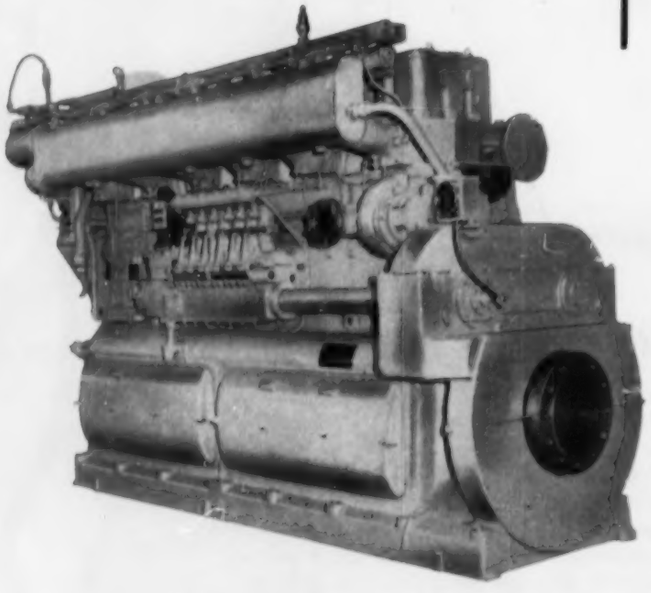

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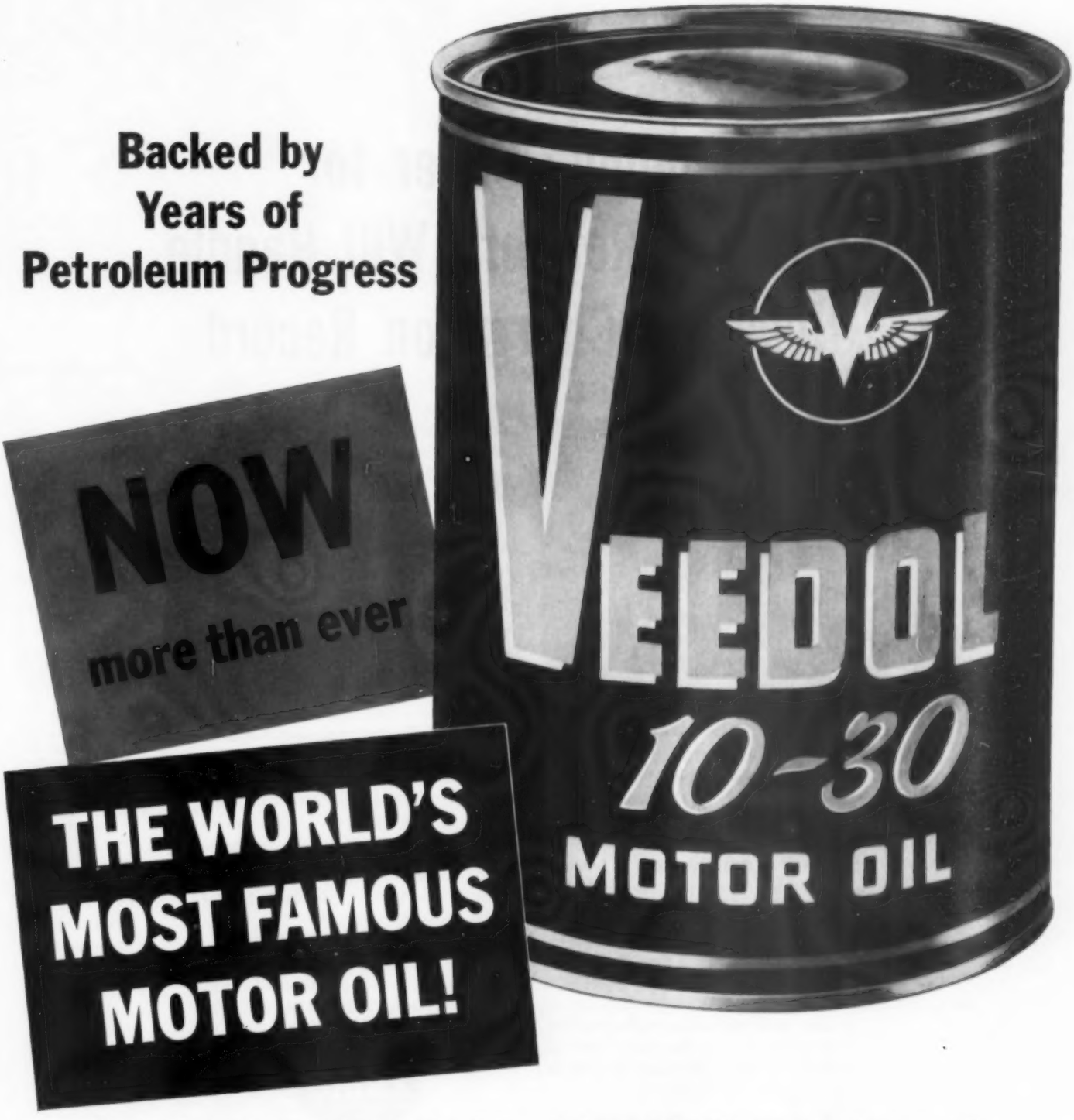

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THIS MONTH'S COVER

A West Texas dust storm photographed for Cities Service Company by Nicholas Parrino. Drillers and equipment on the Ector County rig were protected by a temporary enclosure. Color plates are reproduced through the courtesy of the Editors of *Service*, house magazine of Cities Service Company.

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PROGRESS IN SERVICE THROUGH RESEARCH

Highway Traffic Becomes a National Problem

SIX YEARS AGO, in the autumn of 1949, Alexander Fraser, president of the Shell Union Oil Co., made an address before the National Petroleum Association in which he emphasized the thought that the limiting factor in the growth of the automotive industry in the United States, as events were then proceeding, was the capacity or the country's roadways for handling traffic. Because of the significance of the subject, the article was published in full in WORLD PETROLEUM for November 1949.

Since that time the situation has become far more aggravated, with more than 100 million powered vehicles in operation throughout the world and 60 percent of these within the United States, nearly doubling the total at the end of World War II. Despite yearly rising expenditures for highway improvement, the unfavorable conditions threatening the growth and efficiency of automotive transportation have become steadily more serious and have made this a national—and indeed an international—problem, rather than a state or local one.

As Mr. Fraser pointed out, the great popularity and widespread adoption of the motor car in the United States, even in its earlier years, was due to the freedom of movement which it provided for the individual. This mobility permitted the car owner to move at greater speed and to cover a wider range of travel than other forms of power transportation which were subject to regulation and to a scheduled time table. For that reason it fitted perfectly into the pattern of American life, but its very popularity and widespread adoption contained the seeds of future trouble so long as it was treated as a local or sectional matter.

The first of the state taxes on gasoline, applied in 1919 for the benefit of road building, was 1.70 cents a gallon, but by 1954 the rate had risen to an average of 7.50 cents, including a two-cent emergency tax by the federal government. Receipts had mounted to $3.4 billion a year. In its early days the gasoline tax had been applied specifically to the building and maintenance of highways, a course steadily supported by the members of the oil industry, but state legislatures gradually fell into the cheap and convenient habit of appropriating such funds to purposes having no relation whatever to roads. Opposition to such action and particularly to the federal tax is strong within the industry, but diversion continues to siphon off hundreds of millions to other than highway uses. It is estimated by tax experts that the cost of yearly operation of an average motor car is increased by roundly $150 by taxation that fails to benefit the automobile user.

In the summary of his address in 1949, Mr. Fraser gave as his considered opinion that the "most insidious" contribution to the rising cost of motor vehicle operation was the high cost of congestion upon streets and highways and he illustrated its effect by quoting the results of actual road tests in which time figures substituted for lineal measurements added 20 percent to a 16.5 mile trip which was made the basis for an 18 percent advance in rates. Other indirect results were greater frequency of accidents and the higher cost of insurance, along with the emotional effect of crowding and the lack of parking space in cities and towns. The spectacle of a million or more cars leaving each of the country's larger cities at the beginning of each weekend and crawling toilsomely homeward, bumper to bumper, at the end, has discouraged many car owners from venturing upon main highways during periods of heavy travel.

Solution of the traffic problem has passed beyond the point where it can be settled by devoting 50 to 75 percent of city, town and village street space to the storage of motor cars. Highways were built for the movement of traffic and must be returned to that purpose. The revolution by which this is to be accomplished is under way and progressing rapidly. It is evidenced in the shopping centers being built in open country where a buyer's needs can be met by a single group of shops, flanked by ample space for cars, or in ground areas in existing communities offering equal facilities. This is a social condition, not simply a road problem, and must be so treated. Now, when there is an enforced pause in the movement toward the consideration of the problem as a whole, it should be dealt with from that angle and not merely as an incident in the regulation of a single industry.

Henry King (left) and Joe Henderson of Exploration Surveys International, Dallas, taking gravity reading in Najosa River near Santa Cruz del Sur, southern Camaguey, where Siboney Petroleum Corp. (Sterling Oil and Crescent Petroleum) will start their first 5,000-foot test well.

In March 1952, following a detailed survey of Cuba, Mrs. Knowles wrote for WORLD PETROLEUM the first comprehensive article published in any technical magazine concerning Cuba's oil prospects. At that time, when there was no activity, she pointed out that "Cuba is today's wildcatting challenge to the oil industry . . . due to remarkably favorable conditions for exploration, it may well be another Canada in the making," and described it as "an inviting field for independent operators." That article and another comprehensive article last year, following the Jatibonico discovery, have been reprinted in the thousands to meet the demand of interested oil operators. A great many of the independents now operating in Cuba were stimulated to go there on the basis of information provided by Mrs. Knowles in WORLD PETROLEUM.—*Editor.*

$35 MILLION CUBAN EXPLORATION

Forty Cuban and U.S. oil companies including six majors have obtained rights in Cuba and its offshore shelves.

By Ruth Sheldon Knowles

IT HAS TAKEN almost as long to make the oil world aware that Cuba is an oil province as it did to split the atom. But since the small explosion of interest set off by the Jatibonico sedimentary basin discovery a year ago, events have quickly chain-reacted so that today more than $35 million is committed and planned for Cuban oil exploration during the next five years.

In no other country is such a comprehensive exploration effort underway. Practically all the island and a great part of its offshore shelves are under lease with 34 Cuban and United States independent oil companies and six majors actively at work hunting for the big oil they are convinced is there.

Five years ago a Cuban oil concession was about as salable as a hot dog concession on the moon. Last month, Stanolind Oil and Gas Co., in order to acquire the right to earn an undivided 50 percent interest in some 11 million acres of concession rights owned by Cuban Venezuelan Oil Voting Trust and Trans-Cuba Oil Co., committed itself to spend $10 million in exploration during the next five years. And an individual Cuban paid $5,000 for a 2½ acre lease, with a drilling obligation, in a wildcat area.

Two years ago, not a single exploration well was drilling in Cuba. Today, Trans-Cuba is drilling its fourth deep test in the central Jatibonico basin as part of a $3 million program. Sulgraves Oil Co. is drilling a deep test in the Zapata Peninsula basin, first footage of a 20,000-foot drilling commitment. Cuban American Oil Co. is starting its second deep test of a total 40,000-foot drilling commitment in the Jatibonico basin.

Kewanee Oil Co. is drilling a second deep test in the Jarahueca oil field as part of a million dollar program involving only 25,000 acres, in which it has a 75 percent undivided interest. Siboney Drilling and Exploration Co. (Sterling Oil Co.-Crescent Petroleum-Caribbean Associates) is starting its first test in Camaguey Province as part of a $2 million exploration program. Consolidated Astoria Mines Ltd. is drilling the first of five shallow wells on its north coast concessions. Americuba Petroleum Corp. (Reiter-Foster Oil Co.) is drilling a 4,000-foot test in the Jarahueca oil field and starting a 4,000-foot test in a new wildcatting area in Las Villas Province as part of its $1,500,000 exploration program.

Union Petrolera Aurrera-Jarahueca is drilling a series of shallow tests in Las Villas Province. Perforaciones Oro Negro is drilling a shallow test in Havana Province. There are 15 cable tool wells being drilled by independents throughout the island. Before the end of the year, Benedum and Trees plan a test in the Oriente basin and Cuban Gulf plans a deep test in Las Villas Province.

Atlantic, Standard of California, Pacific Petroleums and La Estrella (Atlantic-Shell-Jersey Standard) are carrying out extensive geological and geophysical programs preliminary to making definite drilling plans.

In addition to all this wildcat exploration, development wells are being drilled in Cuba's two new oil fields—Jatibonico, producing 1,000 b/d, and Cruz Verde, a north coast Havana Province discovery, producing 100 b/d from three wells.

The Cuban boom is one of the most unusual in oil history, for it was started before any big oil discovery had been made, instead of after. A series of dry holes during the past year has intensified interest rather than discouraged it. What has happened is an ideal illustration of Wallace E. Pratt's famous statement, "Where oil really is, in

the final analysis, is in our own heads!"

The prospects of big oil in Cuba remain as unrealized as the day Columbus discovered its first oil seep. Nothing has changed except men's ideas. This change has been dramatic, quick and unparalleled in the development of Latin American oil.

Cuba's oil history had been negative for almost 90 years. From 1865 until last year, only three small oil fields had been found—Bacuranao, Motembo and Jarahueca—producing a total of some three million barrels. These fields, drilled near oil seeps, produced from the serpentine, which is an altered intrusive or altered mud flow. The absence of production from sedimentary rocks was an effective damper to exploration enthusiasm. Furthermore, from 1930 to 1951, Jersey Standard, Atlantic, Shell and Gulf drilled 27 major exploratory wells without finding production and all but Gulf withdrew from further exploration. This was a psychological kiss of death to Cuban oil hopes in the majority of world oil opinion.

Actually, nothing had been proved or disproved in regard to Cuba's oil potentialities. A couple of dozen dry holes can't evaluate the oil prospects of an island covering 28 million acres, plus great submerged shelves—an island which Dr. E. DeGolyer states has more physical evidences of oil than any other country in the world. To add to the absurdity of the situation, almost all this meager exploration activity had been confined to the north coast.

Regardless of her merits, Cuba had become the hometown wallflower at the international oil ball. She had been around too long and the boys thought they knew all about her. It was much more exciting to woo the unknown, and less accessible, Egyptian, Ethiopian or Australian beauties. It took the newcomer to the international scene—the independent oil man—to appreciate what Cuba had to offer and to give her such a rush act that the bigtime stag line is cutting back in to see what they've missed.

What the independents discovered was the most attractive wildcatting territory outside the United States. Here were vast, undrilled, prospective oil lands governed by the most favorable foreign oil law in the world. The geographical location is ideal—58 minutes by air from Miami, and closer to Houston than is New York. In terms of competitive markets, Cuban crude could undersell Gulf Coast as well as Venezuelan or Mexican crude at the U.S. eastern seaboard. Close proximity to equipment supply sources means exploration costs are little more than in the United States, particularly since physically the island is as easy to explore as Florida and easier than many parts of Louisiana.

Added to all this are the availability of plenty of good labor, the highest standard of living in Latin America, the parity of the Cuban peso with the American dollar, and excellent health conditions. And the whipped cream on top of the sundae is a domestic market of 55,000 barrels daily, presently supplied by imports. To further make an oil man drool, there is such a banked-up program of industrial development awaiting an economic fuel supply that this market would almost immediately triple as soon as sufficient production is developed.

Cuba was ripe, but what happened was unprecedented in the history of international oil. Cubans themselves provided a major part of the independent initiative which sparked the current boom. In no other Latin American country has national private enterprise had the courage and vision to participate in the risky business of wildcatting.

In 1948, Cuban, Venezuelan and American capital formed 24 companies and acquired concession rights to some 17 million acres located principally in the southern part of the island and its insular shelf. In 1950, Cuban Venezuelan Oil Voting Trust was formed as a board of management for these companies. CVOVT is headed by Warren Smith, former president of Pantepec Oil Co. in Venezuela. His unwavering faith in Cuba's oil prospects and his persistence and ability in making others aware of them has been the greatest individual contribution to today's boom.

CVOVT did a great deal of geological and gravity meter work throughout the country, directed by Florent Bailly and Rene Engel, of Oil Properties Consultants, Pasadena; Cecil Hagen, Houston; Basil Zavoico, New York; and Frank Fisk, president of Subsurface Studies, Inc., Dallas. These experts championed the theory that the southern basin areas of the island offered excellent chances for the discovery of oil in large quantities as they were comparatively unaltered, showed a minimum disturbance and should have thick sedimentary sections. There were more scoffers than takers of this theory. The large oil companies could not be persuaded to join any drilling exploration program to prove or disprove it.

Glen Ruby, famous international geologist, who made one of the earliest favorable reports on Cuba and who is currently directing the Cuban exploration program of Consolidated Astoria Mines Ltd., comments, "I've helped give birth to the oil field farthest north in the Western Hemisphere and the one farthest south, but I think Cuba will have to be a Caesarian!"

The independents had to perform the operation with no obstetrical help from the majors. Cuban private enterprise continued to respond to the challenge and Trans-Cuba Oil Co. was formed with over 4,000 stockholders contributing $3 million as evidence of their faith in Cuba's neglected oil prospects. Organized by Dr. Viriato Gutierrez, leading sugar man and financier, Dr. Jose Ignacio de la Camara, prominent banker, and Jose M. Bosch, head of the Bacardi rum and sugar interests, this group contracted with CVOVT to carry out a $3 million exploration program on the 24 companies' 17 million acres for a 50 percent undivided interest.

The Cuban government was anxious to do everything possible to encourage this new industry which could mean the deliverance of Cuba from dependence upon its one-crop sugar economy. It bought a National 75 rig to make deep drilling equipment available to independents. A Cuban group, headed by Dr. Antonio Iglesias, outstanding lawyer with a wildcatter's heart, contracted the rig, and on the basis of CVOVT's gravity meter work, drilled an 8,350-foot test. On May Day, 1954, it was completed as a 250-barrel producer of 14 gravity crude at 1,072 feet.

It was a minor discovery as oil fields go, but it acted like a mental battering ram against the psychological barriers obstructing Cuban exploration. The section had been sedimentary all the way with indications that limestones of the Lower Creta-

Cuba's new search for oil is stimulated by such surface discoveries as this large Upper Cretaceous reef capped by a 20-foot bed of hard massive limestone in southern Camaguey.

Jim Shields, Siboney Petroleum Corp. geologist, framed by Cayetano formation near San Vicente in Pinar del Rio, which geologists find one of the most fascinating and challenging areas in Cuba.

This seepage in Puerto Padre, Oriente Province, is the most extensive and freshest land seepage in Cuba, which has more physical evidences of oil than any other country.

ceous could be expected below that depth. The numerous shows of oil and gas in porous beds in the deeper formations made them potential oil or gas reservoirs when found under favorable structural conditions. Scientifically and psychologically, it was a major oil strike.

The boom started. To give it additional impetus, the government made wildcatting even more attractive by reducing concession rentals, exempting exploration companies from a great many taxes and establishing a policy of exploration loans to be repaid out of oil. Such a loan of $1 million was granted to Trans-Cuba to enlarge its exploration program.

It didn't take long for the news to spread among American independent oil operators. Traditionally skeptical of major company infallibility as to where oil may be, they were quick to size up the advantages of this new hunting ground. The chips weren't too blue—the principal factor which has kept independents at home heretofore. The time was right to attract their interest. There were few big, unexplored areas left in the United States. Proration was making it hardly worth while economically to discover production. So, since last May they have been flocking to these greener pastures, making deals with Cuban concession owners and in a year's time starting an amazing amount of activity as evidenced by the accompanying activity map.

CVOVT and Trans-Cuba continue to lead the field. They have jointly made three farmouts. The first was to a California Texas combination of independents—Tevis Morrow, Grady Vaughn and Herb Klein. Their 750,000-acre farmout in the Jatibonico basin has a drilling obligation of 40,000 feet of hole to earn a 50 percent undivided interest. After a 5,000-foot dry hole and before locating a second well, they have been carrying out an extensive geophysical program.

John L. Sullivan and Col. Otis Seagraves of San Antonio formed Cuban Sulgraves Oil Co. to acquire a 160,000-acre farmout in the Zapata Peninsula basin, making a 20,000-foot drilling commitment for a 50 percent undivided interest. Their first hole is now going down.

The farmout to Stanolind is, of course, the biggest deal made in Cuba to date. Stanolind's commitment to spend $10 million means that Stanolind alone will spend as much in five years as Jersey Standard, Atlantic, Shell and Gulf have spent in Cuban exploration during the past 20 years. Stanolind must spend this minimum amount in exploration and drilling in order to earn a 50 percent undivided interest in 11 million acres of concession rights, the majority of which cover the off-shore southern shelves. Consequently, Cuba will see its land and tidelands development come at the same time.

Stanolind must spend $2,000,000 in exploration and drilling by January 1, 1957. During each 12-month period thereafter they have the option to continue the agreement by drilling 40,000 feet of exploratory hole or spending $2,000,000 for exploration, including drilling. They may withdraw at the end of any 12-month period, subject to a forfeit penalty. However, for any productive well brought in, Stanolind retains a half interest in the well and in approximately 80,000 acres around it. Stanolind will be operator of the jointly owned properties.

Stanolind is making aerial photographs of the entire acreage in order to select promising areas for surface geological work. An extensive geophysical program involving seismograph and magnetometer will follow.

Trans-Cuba is left with some three million acres of concession rights for its own exploration program. The company has already set an exploration record in Cuba, having drilled three deep tests since last November in the Jatibonico basin and currently drilling a fourth. Its exploration program is under the direction of Henry E. Linam, independent oil producer and former president of Standard Oil of Venezuela. Mr. Linam is an oil finder of great repute, for under his guidance Standard's Venezuelan production rose from third to first place. He considers Cuba today's most favorable wildcatting area in every respect.

Trans-Cuba made a two year drilling contract with Jones Brothers Drilling Co., of Shreveport. They have not had a minute's shut-down time due to waiting on supplies since they started. With careful planning, they consider drilling in Cuba easier than a great many places in Louisiana.

Trans-Cuba has established another unique record—all the officers and directors of the company serve without salary, including Mr. Linam, who devotes full time to directing the operations. The company is dedicated to working for Cuba's future, over and above thought of personal financial gain.

The second largest independent effort is that of Siboney Exploration and Drilling Co. which for a drilling commitment of 36,000 feet of hole will earn 50 percent interest in five million acres of concession rights held by a Cuban group, Caribbean Associates. One of the first independents on the Cuban scene when the rush started was Jesse True, president of Sterling Oil Co. of Tulsa. He made the original deal with Caribbean Associates. Subsequently, Deep Rock Oil Corp., now Crescent Petroleum, acquired half of Sterling's contract and the two companies jointly formed Siboney. Siboney plans a $2 million program and following detailed geological and gravity meter work are starting their first well in Camaguey Province.

The boom created by the independents has brought the major companies who abandoned Cuba back in a hurry and new ones are beginning to jockey for position to see how they can get in.

Atlantic has reacquired all the concession rights it gave up and is increasing its holdings. With a geophysical program already underway, it plans intensive drilling exploration. La Estrella, owned jointly by Atlantic, Shell and Jersey Standard, is renewing geophysical work on its offshore north coast concessions which it has held for a number of years. Jersey Standard has reopened its Cuban exploration department, doing geological research and studying the concession situation, but to reenter the picture now, it must either obtain farmouts or buy its way back in.

Gulf entered Cuba in 1947 when the others withdrew and has persistently kept a geological research program going. After drilling two deep offshore tests on the north coast, it relinquished its north coast acreage a year ago and acquired concessions in central Cuba. Gulf plans a deep test before the end of the year.

Typical of the belief that oil is where the other fellow thinks it isn't, Standard of California recently acquired all available offshore concession rights given up by Gulf.

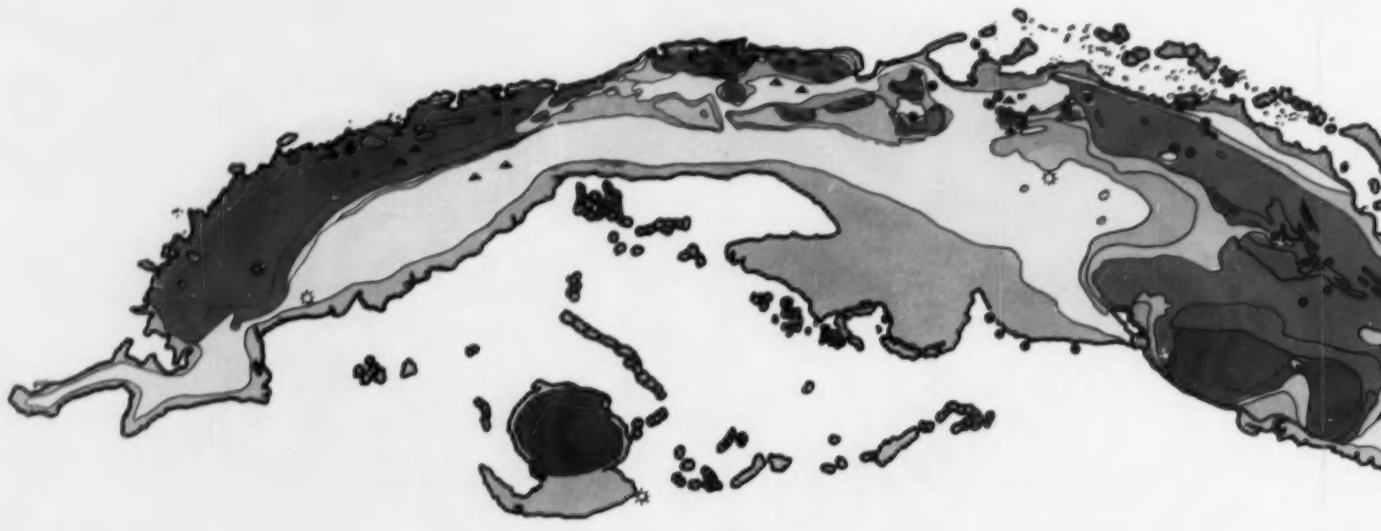
The bandwagon is getting a little crowded now. One major oil company official stated that no major oil company ever withdrew from Cuba on the advice of its scientists. Another commented that he believed that a great many of the wells drilled in Cuba 20 years ago by the majors would have been producers if drilled today, due to modern production practices. A geologist for another major, sent back to Cuba for a survey, commented that the company had sent him back seven years too late—"Somebody is going to luck into a discovery here," he said, "and then we'll really have to pay for concessions we could have gotten for ourselves before."

What can the independent, or major, who would like to enter the Cuban picture at this point expect to find? Is there room for him? The picture, which has been changing with kaleidoscopic rapidity, has settled to the point where some clear answers can be given.

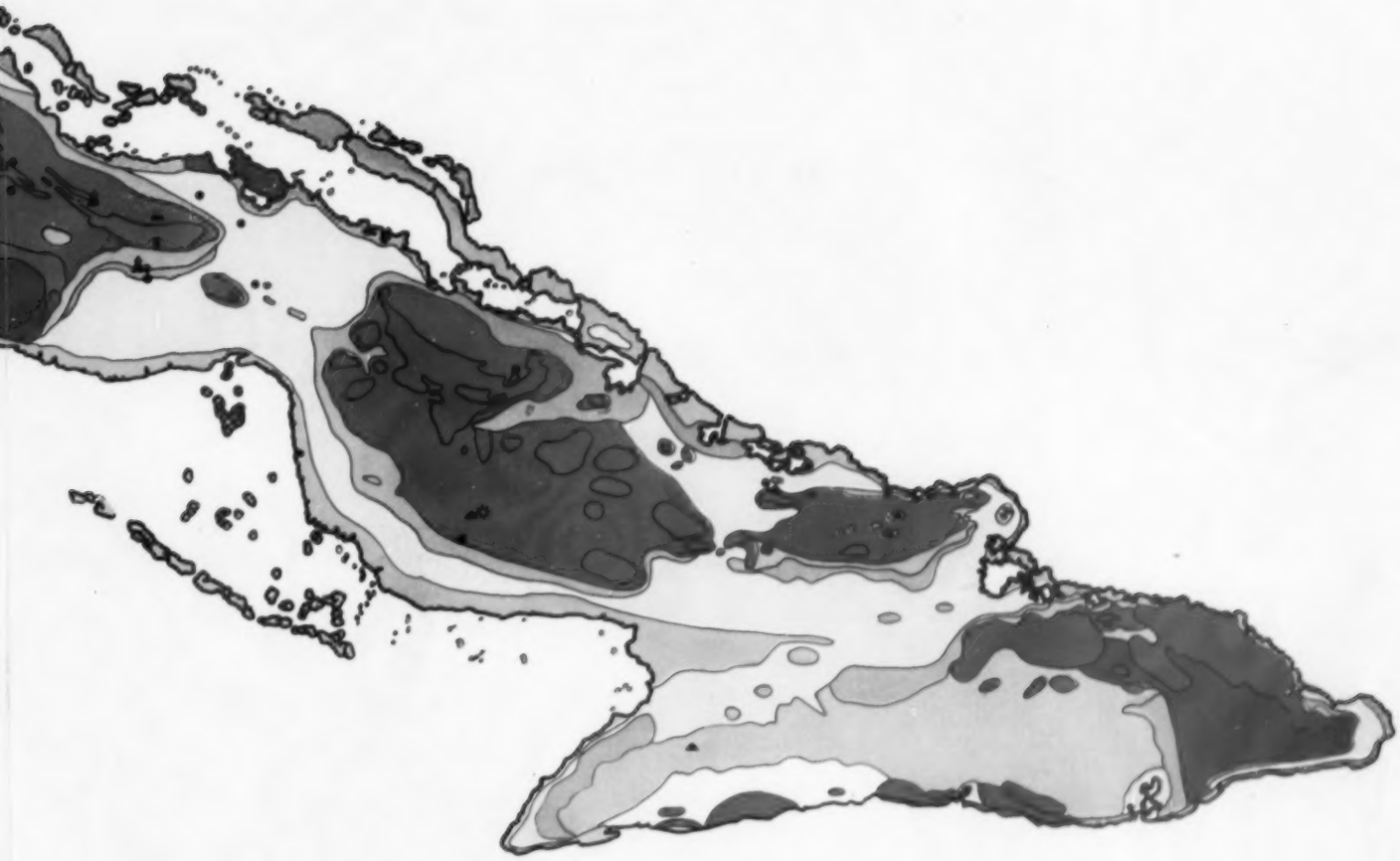
There is plenty of room for any newcomer, large or small, and concessions covering favorable areas are available in any size to fit his exploration pocketbook. Naturally, the ticket of admission costs con-

GEOLOGIC MAP OF CUBA

Based on 1946 map by Geological Commission of the Cuban Ministry of Agriculture, compiled previous to discovery of a deep Cretaceous basin at Jatibonico.



- Quaternary—Recent to Pliocene
- Lower Miocene to Oligocene-Miocene
- Lower to Upper Oligocene
- Lower to Upper Eocene
- Cretaceous
- Schists—Mesozoic
- Upper Jurassic
- Igneous—Acidic and Basic Serpentine

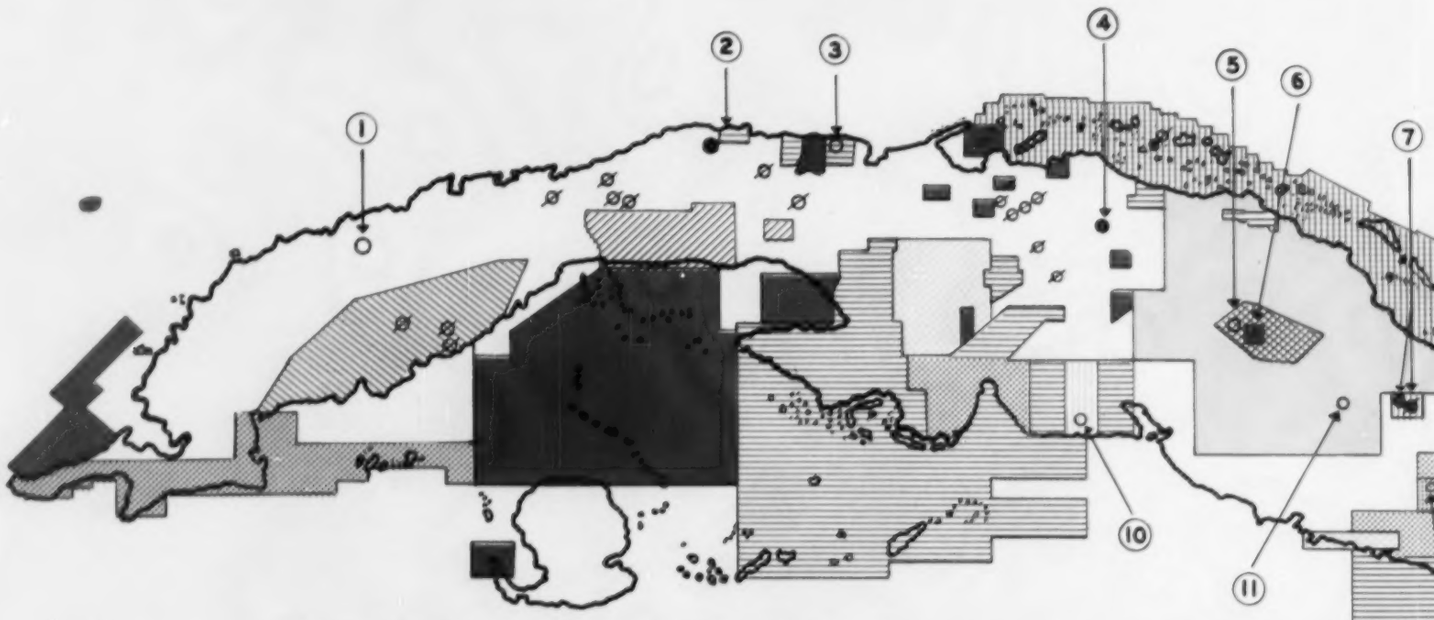


LEGEND

- Gas seeps (principal)
- Oil seeps (principal)
- Asphalt
- Oil field

PETROLEUM EXPLORATION CONCESSIONS IN CUBA

(as of August, 1955)



APPROXIMATE LOCATION AND ESTIMATED ACREAGE OF PRINCIPAL OPERATIONS IN CUBA.

- Dos Estrellas Concession—29,000 acres—(Union Petrolera-Aurrera-Jarahueca 3/8; Kerr McGee 1/8; Cuban Canadian (American-Leduc) 1/2)
- CVOVT—Trans Cuba—3,000,000 acres.
- Stanolind—CVOVT—Trans-Cuba—11,000,000 acres.
- Cuban American—CVOVT—Trans-Cuba—750,000 acres.
- Sulgraves—CVOVT—Trans-Cuba—160,000 acres.
- Americuba Petroleum—200,000 acres.
- Siboney Petroleum (Sterling-Crescent) and Caribbean Associates—5,000,000 acres.
- Kewanee—Union Petrolera-Aurrera-Jarahueca—25,000 acres.
- Benedum & Trees—Russell Cobb—40,000 acres.
- Pacific Petroleum—William Duce—4,000,000 acres.
- Ted Jones Enterprises—30,000 acres.
- Consolidated Astoria Mines Ltd.—30,000 acres.
- Union Petrolera Aurrera-Jarahueca—112,500 acres.
- Cuban Colombian—860,000 acres.
- Gulf—750,000 acres.
- Standard of California—750,000 acres.
- Atlantic—1,500,000 acres.
- Atlantic—Shell—Jersey—750,000 acres.
- Shell—750,000 acres.

Not Shown—Cuban Canadian (American Leduc) with 5,000,000 acres scattered throughout island.

(1) 2 cable tool tests drilling.

(2) 7 new producing wells completed—Ted Jones, Cruz Verde and Salomon Oils; no estimate potential production. 1 well drilling.

(3) Consolidated Astoria, 1st of 5 wells drilling.

(4) 8 cable tool wells drilling.

(5) Union Petrolera-Aurrera-Jarahueca 1,600' well now testing.

(6) Location Americuba 4,000' test to start in 60 days.

(7) Kewanee 7,200' well dry. Second 9,000' test well drilling. Kewanee starting shallow wells; Americuba starting shallow wells; field producing 200 b/d.

(8) Dos Estrellas—22 wells drilled—estimated production 1,000 b/d.

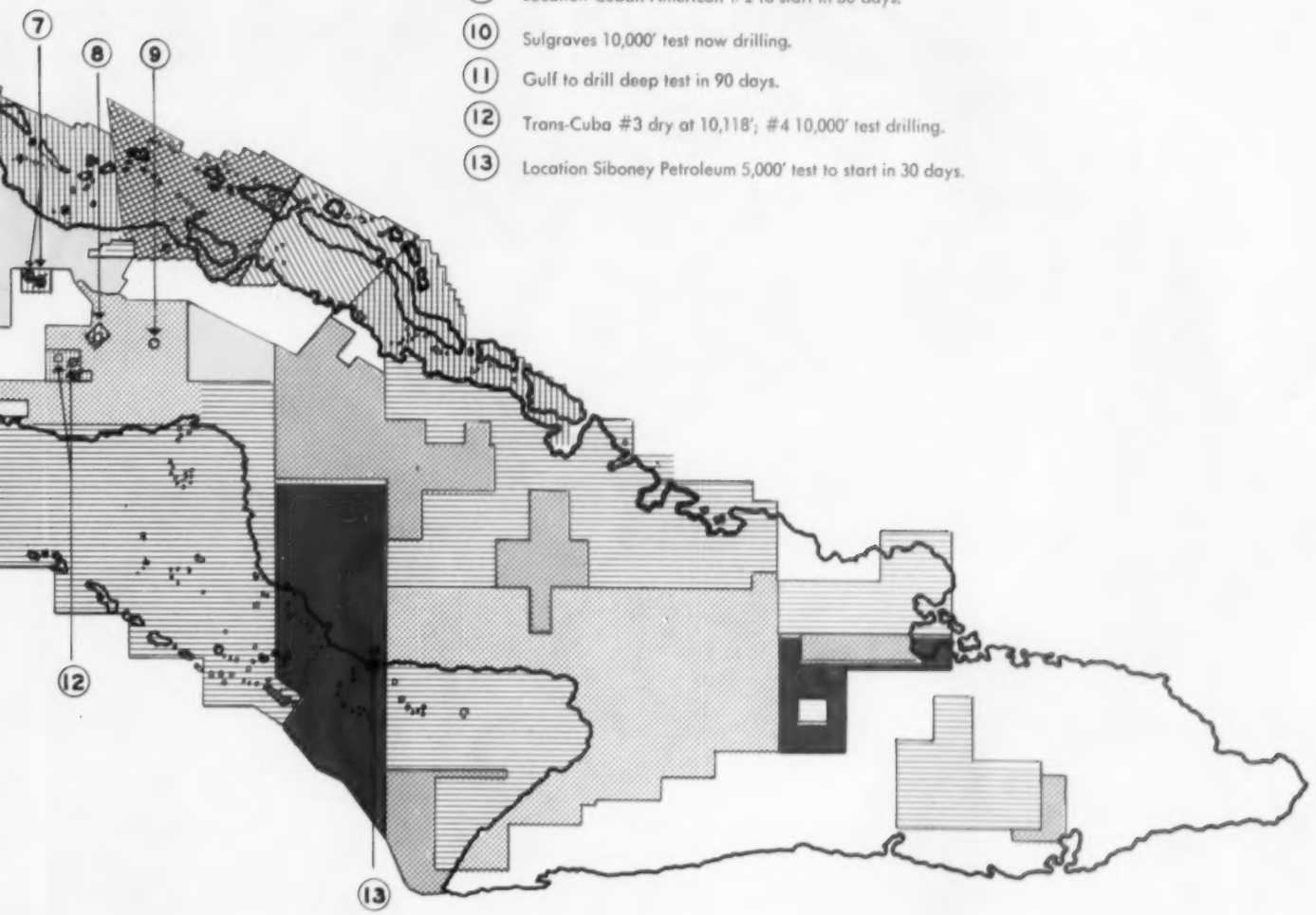
(9) Location Cuban-American #2 to start in 30 days.

(10) Sulgraves 10,000' test now drilling.

(11) Gulf to drill deep test in 90 days.

(12) Trans-Cuba #3 dry at 10,118'; #4 10,000' test drilling.

(13) Location Siboney Petroleum 5,000' test to start in 30 days.



REFERENCE SYMBOLS

○ Location

● Oil

☼ Gas

∅ Dry

siderably more than it did a year ago, as there are practically no concessions available direct from the government. However, a great many independents have acquired larger amounts of concession rights than they can possibly hope to evaluate with just their own exploration capital. The welcome mat is at the door for anyone with farmouts on his mind—but he must be prepared to make drilling commitments. The Cuban pattern of deals is a commitment to drill so many feet of hole in order to earn a working interest in a prospect. In a great many cases, cash and an override are also involved.

Concessions are originally obtained from the government, permitting a three year exploration period, and for the next five years rentals on exploration concessions have been reduced from approximately six cents an acre to approximately two cents an acre. After the exploration period, concessions can be converted into exploitation concessions of 30 years duration with four cents per acre rentals the first ten years, eight cents the second ten years and 16 cents the last ten years; plus the first well started within five years and every five years thereafter, one well drilled to 4,000 feet for every 60,000 acres. Government royalty is 10 percent and the landowner receives one percent.

In very few cases will the newcomer deal in exploration concessions. What practically everybody in the island has at this point are concession rights—which means they have made applications for concessions which have been accepted by the government and gives them the right to convert the applications into exploration concessions. The newcomer and his lawyer must forget the kind of title check common in the U.S. and be prepared to adjust their thinking to a different type of legal situation.

However, the newcomer must be particularly careful in checking the validity of concession rights, or applications. A minimum of five million acres of concession rights are currently subject to controversy. When the government issued a decree last year opening national reserves to concessionaires, the decree was amended in a later publication of the Official Gazette. The legal problem is, which decree established the official date of opening the reserves. Many overlapping applications were filed on the two dates. The government is expected to issue its interpretation of the valid date, but this will not solve the problem. Any concessionaire is free to take his disappointment over the decision to the Supreme Court, which could mean a matter of years before the legal picture is clear concerning many concession rights.

Geologically, the newcomer will find one of the most fascinating wildcatting challenges in the world. Like Emerson's definition of a weed as a plant whose virtues have not yet been discovered, Cuba's geology is complicated only because so little effort has been made in the past to figure it out.

Mrs. Dollie Radler Hall, consulting geologist of Tulsa, who was former administrative geologist of Amerada Petroleum Corp., has made one of the most intensive and comprehensive studies of Cuba's geology. She states, "There is evidence that some form of petroleum is present in every province of Cuba, that there is a very thick section of sedimentary rocks from Jurassic to recent time that has not been explored . . . there is ample proof that these rocks under proper conditions could form excellent reservoirs and there is also present plenty of source material."

There is practically no part of the island that is not prospective oil territory. Mrs. Hall points out that one of the greatest obstacles to exploration in Cuba has been that "everybody has called everything green, serpentine, and everything hard, granite."

Each new well drilled is adding its bit to solving the problems. Some are making startling geological discoveries even if they don't find oil. During the past few months the existence of a thick Tertiary basin in central Cuba has been proved by three wells. Cuban Canadian (American Leduc), which owns half of the Jatibonico oil field, in drilling a development well last April, drilled 4,500 feet in typical Gulf Coast shales and sands of Lower Eocene. Cuban Colombian found the same situation in its 4,500-foot wildcat eight miles west of the Jatibonico field. Then last month Trans-Cuba bottomed its Sancti Spiritus No. 1 wildcat, over 15 miles west of Jatibonico, at 10,118 feet, still in Tertiary. The fields are bound to be there, the only question now being "Where?" Trans-Cuba people believe they are on the trail, as the result of seismograph work interpreted on the basis of this last well and for their current test have moved 4½ miles further west and a little north.

The drilling cart has had to come before the seismograph horse in Cuba. Information about the sedimentary section has to be obtained by exploration drilling in order to be able to interpret seismograph results. Seismograph will become increasingly useful as more wells are drilled and velocity surveys made. However, surface geology, gravity meter and drilling are still the primary oil finding tools.

The newcomer will have no difficulty now in finding exploration service organizations available who have experience in Cuba. Subsurface Studies, Inc., of Dallas, is doing gravity meter work in eastern Cuba for Trans-Cuba. Exploration Surveys, of Dallas, has done both land and water gravity work for Siboney Exploration on the south coast. Rayflex Exploration Co., Dallas, has been doing seismograph work for Cuban American and Trans-Cuba. Petty Geophysical, Houston, is doing seismograph work for Atlantic, Shell and Gulf. Geomarine Services International (GSI) of Dallas, will do work on the north coast for Standard of California. Both Schlumberger and Halliburton can now service your well in Cuba almost as quickly and efficiently as in the States. There is even an oil news service, Cuba Petroleum News Digest, published twice monthly.

The newcomer will find the most cooperative government in the world to help him with his problems. On the working level, Ing. Antonio Calvache, Director of Mines, and Dr. Jorge Brodermann, head of the Cuban Geological Survey, have for many years done everything possible to promote interest in Cuba's oil prospects and to make information available. On the political level, oil is now as important a word as sugar in Cuba and is the password for assistance and consideration.

All in all, the newcomer will find that operating in Cuba today is as much like home as it is possible for a foreign venture to be. It is so much like home, that his principal problem will be to constantly remind himself that he is operating in a foreign country and not to become annoyed when he does find things different—when he encounters a delay in doing business, or somebody doesn't understand him, or if he doesn't happen to like black beans and rice and lots of sugar in his coffee.

There will undoubtedly be as dramatic a change in the Cuban oil situation in another year's time as there has been during the past year. The boom has come without the oil, so now it is time for the big oil.

Even without any further commitments, the $35 million now dedicated to Cuban exploration should find it. As a matter of fact, this amount is the equivalent of $75 to $100 million in terms of exploration in other foreign countries. Venezuela is a good example. In eastern Venezuela, two United States companies spent $44 million and 15 years from the time they first started to look for oil and the time they sold their first commercial oil. Only part of that money went for actual exploration and drilling. They had to survey the whole state of Anzoategui, all the district and municipal lines and many of the private properties in order to find out where their concessions were. They had to build roads, bridges and whole communities complete from schools to hospitals. They had to import 30,000 different material and equipment items—everything from toothpicks to drilling boilers, ordering six months in advance of the time needed. They had to build long pipe lines and harbor terminals.

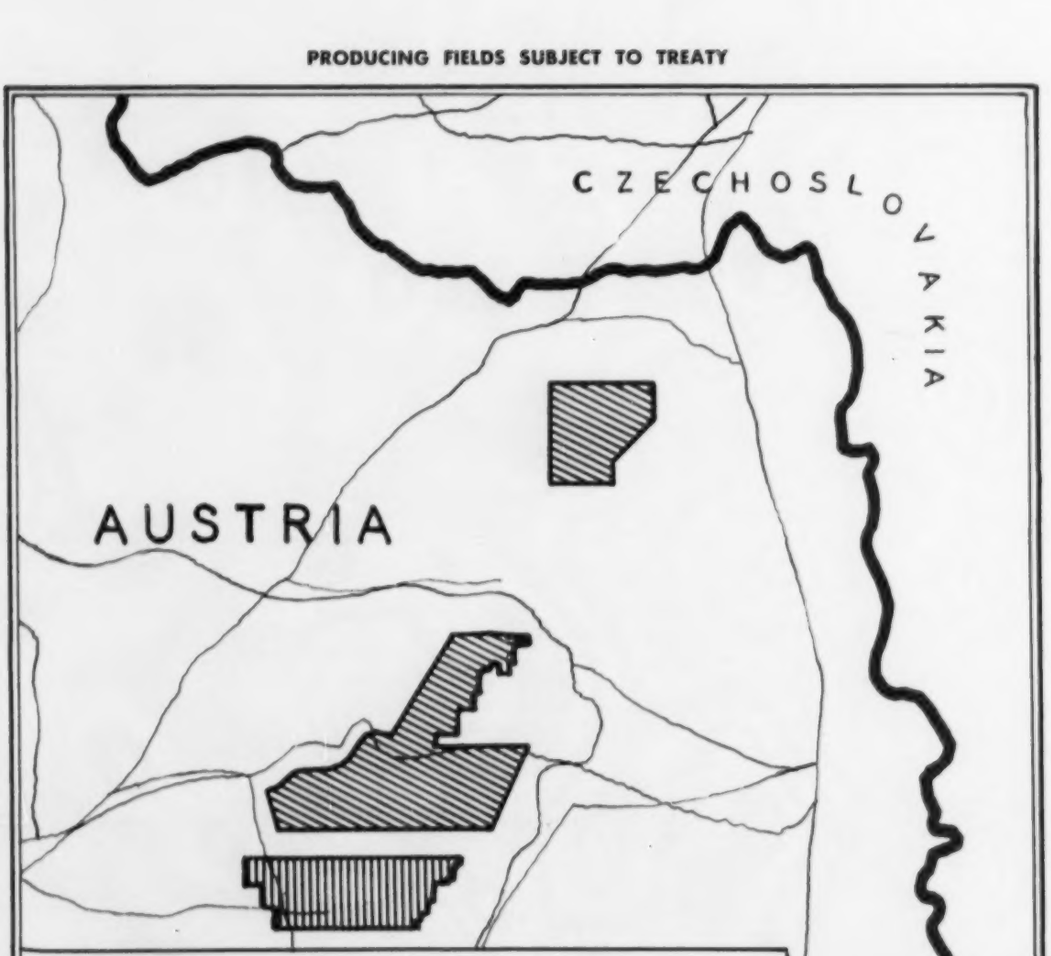
In Cuba these things are not necessary so the rules of thumb about the many millions necessary to find oil in foreign countries do not apply there. A dollar in Cuba will get a dollar's worth of actual exploration and drilling.

Most important of all, the $35 million is being spent by 34 Cuban and American independent operators and six major companies instead of one or two companies. Dr. E. DeGolyer considers multiple effort the most important factor in successful oil finding.

Now that Cuban oil has been found in so many different minds, it may not be long before it will be found in Cuba's rocks!

OIL AND THE AUSTRIAN PEACE

PRODUCING FIELDS SUBJECT TO TREATY



TREATY

About 21,479 b/d of Austrian production over the next 10 years is to go to Russia. In return, the oilfields and installations are to be returned to Austrian control and ownership. Although their subsurface condition is not yet known, the producing fields appear on the surface to be in normal condition.

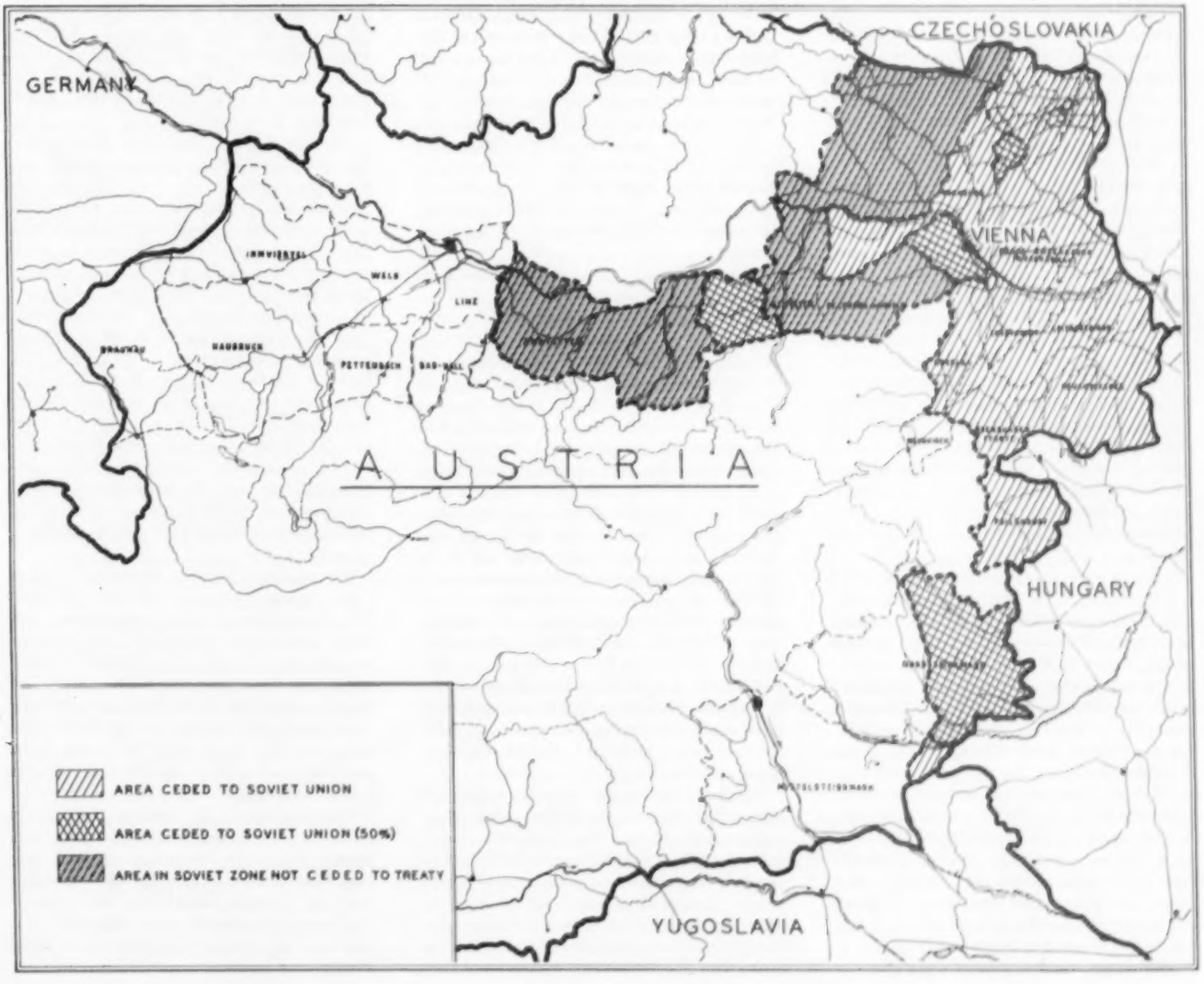
ON July 27, 1955 the State Treaty went into effect. Austria was restored to her pre-war status as a free and independent country with boundaries identical to those of January 1, 1938, before the time of the Anschluss.

Part of the Austrian oil fields, exploration rights, refineries and marketing facilities were ceded to Russia under the Treaty and simultaneously restored by an annex to the Treaty worked out April 15, 1955 in Moscow. The price for restoration of these oil facilities was payment of 10 million tons of crude oil over 10 years, averaging about 19,178 b/d.[1] An additional 1,200,000 tons forms part of the 150 million dollar payment outlined below, making a total of 23,014 b/d payable the first six years and 19,178 b/d during the last four for an average of 21,479 b/d over the ten years.

The Austrian press estimates the price paid for the oil fields as follows. Their calculations show the value of one year's production at 1954 rates to be about 100 million dollars, using a value of 20 dollars per ton plus value of natural gas and value added by refining. The total cost of oil delivered to the Soviets is, on the same value basis, about 224 million dollars, including 200 million dollars for the 10 million tons to be

[1] All conversions have been made at 7 barrels per metric ton.

EXPLORATION AREAS SUBJECT TO TREATY



delivered for the oil facilities, plus 24 million dollars for the 1.2 million tons to be delivered over the initial six year period.

Their calculations also include 150 million dollars to be paid over six years to the Soviets for "other German assets" returned. The 1.2 million tons of crude mentioned above forms part of this. The result is a total payment of around U.S. $350 million. At the prevailing exchange rate this is about 9.1 billion Austrian shillings, or around 10.3 percent of Austrian gross national production during 1954. Sources in Austria feel that this amount is well within the capabilities of the Austrian economy. What remains to be seen, however, is how crude production holds up. If production levels fail to match the rapidly-rising Austrian consumption, the payment will be extremely difficult.

The oil terms of the treaty cover all phases of the industry. In exploration the areas turned over, as shown in the accompanying maps, cover about 1,893,626 acres or 2,959 square miles comprised in 26 separate concessions. As specified in the State Treaty, the initial duration of these exploration concessions was eight years, or until May 27, 1963. The right to produce any oil discovered was given to the Soviet Union for 25 years from the date of discovery. When these were given back to Austria under the terms of the April 15 Soviet-Austrian understanding, they were prohibited under Section 13 of Article 22 of the Treaty from passing to foreign ownerships. Nothing in this understanding would, however, preclude foreigners from operating these areas under contract.

The principal foreign-owned company which was exploring in these areas before the war was Rohoelgewinnungs, A.G. (RAG), owned 50-50 by Socony Mobil and Shell companies. Vacuum Oil Company had carried out surface reconnaissance in the early 1920's and the information developed led to the first wildcat drilling by a German named Anton Raky who struck oil at 2,785 feet near Windisch-Baumgarten in August 1930 and again in 1932 near Goesting, both in the Zisterdorf region of lower Austria, at 2,575 feet. Standard Oil (N.J.) also held extensive exploration concessions in the prewar era.

RAG is now exploring in western Austria and will start drilling in September. Operations are confined to Upper Austria near Timmelkamm, in the so-called Molasse geologic zone outside of the Soviet occupation zone. Operations are being conducted under very recent concessions issued under the terms of the Bitumen Law. It replaced the very old Austrian mining law in respect to petroleum when the Germans took over in 1938 and remains the governing petroleum law today. It is a very brief but satisfactory law which leaves much of concession terms up to negotiation. Both exploration and exploitation are covered in concession terms, with a favorable royalty rate of about five percent generally prevailing.

Several producing fields were ceded to Russia under the Treaty and were also returned to Austrian control by the April 15 agreement.

In addition to exploration areas the producing fields designated in the accompanying map were ceded to Russia under the State Treaty. They were returned to Austrian control under the terms of the April 15 agreement subject to provision that they could not pass to foreign ownership. It appears, however, that nothing would prevent their operation by foreign-owned companies under contract to the Austrian government.

The petroleum properties were administered by the Soviets through the Soviet Mineral Oil Administration or SMV. Distribution was handled by a subsidiary Austrian organization known as OROP which had a monopoly in the Soviet zone. The only non-Soviet producing companies, RAG and Van Sickle, were compelled to sell their production to the SMV at less than legal price.

Outside of the Russians, no one knows yet what the fields' conditions underground are. They were returned officially August 13 and Prime Minister Raab of the Austrian Government made a tour of the fields August 3. He described them as in good condition and the head of the Soviet Mineral Oil Administration (SMV), Tscheplakow, was said to have been cooperative in supplying all requested information. Recent western observers who have made a tour of the fields report that installations above the ground lag behind U.S. petroleum development by 20 to 25 years. Their condition is serviceable, however, and there is no visible evidence of mistreatment at the hands of the Russians.

The possibility exists that the Russians exploited the fields rapidly, perhaps in excess of maximum efficient rate, during the immediate post-war period. A series of new developments began, however, including the Matzen field in 1949, Aderkla in 1950 and Blockfliess in 1951. These fields were all drilled in the 3,000 mile square Vienna Basin on structures previously mapped by RAG. They resulted in production rising from 1,074 b/d in 1938 to an estimate 65,205 b/d in 1954. The increase was irregular, reaching 23,013 b/d in 1944 during the period of forced exploitation of the old fields by the Germans, falling with their decline to 17,260 b/d in 1947 and thereafter rising steadily, with new discoveries to reported levels of 28,767 b/d in 1950, 42,192 b/d in 1951, 51,781 b/d in 1952, 61,370 b/d in 1953 and 65,205 b/d in 1954. During this latter period the rate of exploitation may not have been excessive since production was sufficient for local needs and allowed considerable export.

Pending the formation of a permanent agency, the Austrian oil fields are being administered by a four-man Oil Trustee Committee. One of the members of this group has estimated reserves remaining in Austria at considerably above levels thought likely by U.S. observers. Pending an examination, however, nothing definite can be said about the fields' subsurface condition.

In the refining sector the USSR has given ownership under the State Treaty of five oil refineries, totaling 35,262 b/d or 82.73 percent of total Austrian capacity. The only refineries excepted were the Kagran refinery of Vacuum Oil Co. with 4,200 b/d capacity and the Floridsdorf refinery of Shell with the same capacity. Under the April 15 agreement, five refineries are being transferred back to Austrian ownership. Some of them are subject to claims by the western oil companies. There is no prohibition in the Treaty against their being transferred to foreign ownership.

Further properties ceded to the Soviet Union included nine marketing companies and their subsidiary facilities such as pipe lines, approach roads, etc. All these were returned by the April 15, 1955 agreement and no prohibition is contained against their being held by foreigners.

The present situation in Austria is one of outmoded refining facilities and rapidly-rising internal consumption. Total runs of all refineries during 1954, according to the Austrian government, were 1,308,400 tons or 25,092 b/d. Of this total, fuel oil was the largest product with 55.95 percent; followed by diesel oil, 23.4 percent; motor gasoline, 12.19 percent; lubes and greases, 3.45 percent; industrial gasoline .5 percent; kerosine 1.91 percent; and other bitumens, 2.54 percent for a total of 99.49 percent due to rounding of figures.

The problem of outmoded Austrian refineries comprises one of the country's outstanding problems. The cost of their modernization is estimated at about $20 million.

As a marketing unit Austria had a total domestic consumption during 1954 of 25,184 b/d according to the Austrian government, up 28 percent from 1953. This is 38.6 percent of production during 1954, leaving a substantial export surplus of 60,066 b/d. Total commercial exports were only 1,847 b/d, however, so the remaining 39,219 b/d must have gone into the Soviet economy. There were even some imports, amounting to 1,939 b/d during 1954 to satisfy domestic requirements, principally because domestic consumption was considerably higher in motor gasoline than could be obtained from domestic refineries which have no cracking capacity.

The Austrian political situation is one of equal balance between the two principal parties, the Peoples party representing the conservatives and the Socialist party representing the liberals. The People's party stands for free enterprise, including the oil industry, while the Socialists have expressed their desire for nationalization of oil. The administration is a coalition group with roughly equal cabinet representation of the two main parties.

The debate over the future of the eastern oil fields goes on and has not, as yet, been settled. Since the companies involved, Socony Mobil, Shell, and Van Sickle, have made no protest concerning the terms of the Treaty, however, it appears that they are confident of an equitable solution to their claims.

Colombia liberalizes oil laws

Government seeks to stimulate exploration by limiting taxes and providing special inducements for search in difficult inland areas.

THE trend toward a favorable operating climate in Colombia has finally made that country a favorable site for petroleum exploration and development. Decree 2140 of August 3, 1955 fundamentally encouraged operations by limiting the total government take in western Colombia to a maximum of 50 percent and a minimum of 40 percent of net income. For eastern Colombia it was limited in the same decree to 40 percent.

While this may not appear to be the most favorable basis for operations in a country which has yet to prove its potentialities as a major producer, it is a distinct improvement over the climate that has prevailed to now, and as a result of the new decree several major companies have manifested renewed interest in Colombia. Their interest is stimulated also by Colombian geological possibilities, which remain about the fifth best in Latin America.

The trend in Colombian legislation which led to this improvement began in 1952 with modification of the old Law 37 of 1931 and Law 160 of 1936. The most important of the modifications, and the principal governing legislation in Colombia today, is Decree 1056 of April 20, 1953, known as the Petroleum Code. While the Petroleum Code was a great improvement and provided for a depletion provision with allowance as well as amortization of exploratory expenses, the sum of the liberalization was not sufficient to stimulate great exploratory activity. Colombia remained one of the highest cost countries of Latin America, with the government take estimated by Colombian sources at over 60 percent of principal oil operators' net income.

On May 10, 1955 Decree 0584 increased depletion allowances for operation in western Colombia to 35 percent of net income, retaining the previous limit of 10 percent of gross by means of a special 15 percent.

In view of the disappointing results of Colombian exploration and a lowered total of exploratory activity, the Colombian government decided to further exploration by providing new incentives. On March 10, 1955 the new decree 0584 was passed which liberalized the fiscal provisions of the Petroleum Code considerably. The depletion allowances were set at 10 percent of gross up to 35 percent of net income for western Colombia and 12½ percent of gross up to 50 percent for eastern Colombia, a more difficult and expensive area in which to operate. The depletion allowances were limited to the recovery of capital invested, however, and proved disappointing to many oil operators and, in their opinions, insufficient to attract important quantities of petroleum exploration investment.

As a result, the government passed on August 3, the new Decree 2140, which was published in the Official Gazette August 25, 1955. The provisions of this decree are contained in the following summary of Colombian legal requirements governing petroleum operations, but the decree's principal provisions were as follows: the most important provision was, as previously stated, the limitation of the government's total receipts through taxation to 40 to 50 percent of net income of petroleum producers in western Colombia. In eastern Colombia, on the opposite side of the Cordillera, which divides Colombia, government taxation was limited to 40 percent maximum of net income of petroleum operators.

In addition to these provisions the decree lengthened the exploitation concession duration in eastern Colombia, as covered below. The principal fault of the depletion allowance, its limitation to recovery of capital investment, was removed for operators in western Colombia investing at least 2 million pesos per year (about $515,000 at the 25.75 cents per dollar rate) by applying same irrespective of capital investment. The limit of 35 percent of net income was retained, but for operators already producing oil it was raised to 50 percent. For eastern Colombia it was raised to 27½ percent of gross, up to 50 percent of net income. Finally, for operators in eastern Colombia the royalty scale was reduced to a flat 3 percent.

As the situation now stands there are no discriminatory regulations militating against operations by foreign companies. The situation as regards operations on private lands in Colombia, on which the subsoil rights are maintained in many cases, remains the same, but on government lands, surface exploration may be freely conducted. Exploration-exploitation contracts may be concluded with the government over western Colombian areas which provide for exploration areas of a maximum 137,050 acres or up to 548,200 acres in eastern Colombia. There is no limitation on the number of such areas which may be held by one company or person.

The exploration term is initially five years, with an "ordinary" extension possible for three years additional and an "extraordinary" extension possible for three years more. This makes the total possible exploration period 11 years, contingent on adherence to the regulations and drilling of two wells during the ordinary extension and increased surface taxes in the extraordinary extension. In eastern Colombia there is a seven-year initial period with the same extension possible for a total possible term of 13 years, contingent on drilling of one well per year during the extraordinary extension.

Exploration surface taxes in western Colombia range from 0.20 peso per hectare or 2.08 U.S. cents per acre to 2.00 pesos per hectare or 20.8 cents per acre during the eighth year. In the ninth year and thereafter the rate is 3.00 pesos per hectare or 31.34 U.S. cents per acre. These are reduced by one-half while exploratory drilling is in progress and during the exploitation period. In eastern Colombia they range from 0.10 peso per year or 1.04 U.S. cents per acre in the first and second year to 5.2 U.S. cents per acre per year or 0.50 peso per hectare per year in the sixth and following years.

Exemption from import duties on equipment and materials is granted during the exploration periods, as well as exemption from the Colombia patrimony tax until exploration begins.

Exploitation rights have an initial duration of 30 years plus an extension, subject to the laws then in force, of 10 years additional. In eastern Colombia the initial duration is 50 years plus an extension of 20 years more, also subject to the laws then in force. No limit is placed on the size of the exploitation area.

Royalty in the eastern zone is limited to three percent of production, minus field use. In western Colombia the royalty varies from seven percent on production obtained within 62 miles of the coast to 0.5 percent on production over 559 miles from the coast. The depletion allowances previously cited apply. Exploration concessionaires in western Colombia are also given the right to amortize the cost of exploration and dry holes at 10 percent yearly.

If the new regulation stimulates exploration in Colombia it at least would be a start toward solving the country's petroleum problems. Between 1946 and 1949 exploration in Colombia was extremely active; however, disappointing results combined with unfavorable legislation and high costs combined to make most of the companies pull out by 1950. By far the majority of production now comes from three areas, the De Mares, Barco and Yondo fields. The output of these fields averaged 109,500 b/d during 1954 but has not shown significant increase since the Yondo concession began production during 1945. Both the other fields are pre-war and slowly declining. The

(Continued on page 76)

REFINERY MAINTENANCE

By Alan McCone*

RECORD INVESTMENT in new refineries and new processing units in the first post-war decade has equipped the oil industry with facilities capable of manufacturing high quality products with an unusually high on-stream efficiency. In the process of pouring billions of dollars into these new installations the industry has run into many thorny maintenance problems.

The change in the approach to the maintenance picture derives basically from the change in refining techniques—from batch still operation to the continuous process and more recently the very large capacity built into single units. Crude stills have mushroomed in a few short years to capacities as high as 75,000, 100,000 and 125,000 barrels of throughput per day. Cracking units of a few thousand barrels per day before World War II have grown to 50,000 barrels per day and higher. Many new post-war refineries have been built with only one crude still and one cracking unit.

The matter of scheduling maintenance work was relatively simple when it was possible to shut down a unit for repair which represented only a small portion of total throughput. With this problem a maintenance force could be kept basically uniform throughout the year. Now refiners have their total throughput tied up in sometimes one and at most a few extremely large items of equipment. When it is necessary to turn around one of these units, it must be done on a very short schedule so that a large force is required more often on a three-shift basis.

In facing this problem the refiner places major importance on the thoroughness of the inspection and soundness of workmanship performed during the turnaround so that a maximum run may be expected before another shut-down is indicated. With this general philosophy most refineries have felt that they should have a large staff of mechanics and supervisors who are intimately familiar with the units. When this approach is adopted, there is a serious problem in the matter of economic use of manpower.

It is evident that the refiner cannot afford to have as a permanent staff the full force required at the peak of a shut-down. Between major shut-downs the operator may have difficulty finding sufficient work to keep a skeleton force of mechanical specialists and supervisors busy. The ideal solution to this problem would be to have an unlimited number of qualified mechanics and supervisors familiar with the equipment and employable on an as-required basis. This would mean that the operator would give his valuable units the careful attention they require and still not have the problem of making work for extra manpower between peak requirements. In addition, he is not creating increasing liabilities through fringe benefits for a permanent organization. It is evident that as employees attain service their productivity diminishes at the point at which they are possibly receiving their highest compensation and when the company's liability for health insurance or retirement is at its peak.

In a symposium on maintenance at the recent mid-year meeting of the American Petroleum Institute's division of refining, John W. Towler of Union Oil Co. of California reported on a plan his company has used to minimize maintenance problems by employing a general contractor to supply fluctuating manpower requirements at its Los Angeles and Oleum plants. Policy is to maintain a basic company force supplemented by a permanent contractor force which can be expanded to meet peak requirements. Union maintains a permanent force of 175 men, the contractor's basic crew is 100 and this has been augmented at times by the employment of 400 additional craftsmen when scheduled shut-downs occur.

A somewhat similar maintenance operation in the Sarnia, Ontario, area has created a situation in which the ideal conditions have been approached. Catalytic Construction of Canada Ltd. is performing the entire maintenance program for Sun Oil of Canada, a large volume of the maintenance for Canadian Oil Refineries Ltd., and miscellaneous maintenance work of Polymer Corp., Dow Chemical Co., Imperial Oil Ltd., Cabot Carbon Co. and Fiberglas in the Sarnia area. This volume of work has meant a continuity of employment for a majority of the local building and construction mechanics required to meet the emergency and scheduled shut-down requirements of these industrial plants. This has meant that these specially-skilled mechanics have had the opportunity of becoming as familiar with the plant units during the turn-around as would a permanent employee of the company. The contractor has a vast reserve of skilled manpower to draw upon, and they are paid only for the hours in which they can be profitably employed.

Although Catalytic's operations at the Sun Oil plant and at Canadian Oil are somewhat different, together they form the basis for an overall maintenance service in the Sarnia area. At Canadian Oil Refineries Ltd., Catalytic supplies a superintendent who is answerable to the refinery

*Assistant to the President, Catalytic Construction Co., Philadelphia.

maintenance superintendent. Our forces have ranged from three men to 250—the latter figure having been reached at one occasion on two days notice. With this staff Catalytic has provided supervision, necessary engineering and corrosion inspection services. Canadian Oil Refineries has a base crew which performs routine and shift maintenance.

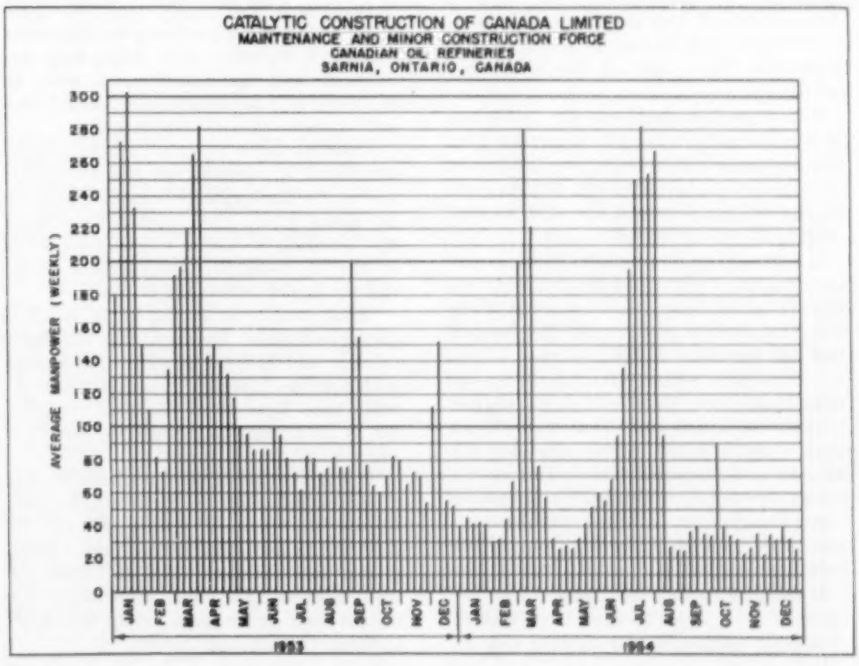
At the Sun refinery, Catalytic performs all the maintenance service including the routine and round-the-clock maintenance. Catalytic has a maintenance superintendent, an assistant superintendent, one engineer, five foremen, and 56 men in addition to those more specifically mentioned above.

The entire maintenance operation is controlled by a maintenance budget set by Sun Oil and controlled financially by the plant superintendent. The maintenace functions, such as routine maintenance in the plant, offices, work shops, turn-arounds, gardening, etc., are controlled by the Catalytic superintendent. Catalytic also supplies by contract all the tools, heavy equipment and vehicles.

All maintenance operations are performed within an operating budget which is established on a weekly basis. The Sun maintenance operation has required an expansion to 250 for a major turn-around with the termination of the force as rapidly as that individual's work came to an end. It is evident that this type of operation would not be as successful in a single plant in an area, because without the opportunity to move from one operation to another with considerable regularity, the familiarity with the plant and the loyalty to the employer's interests would not develop in the same manner as it has in the Sarnia operation. However, since in all turn-around operations it is necessary to supplement the basic forces, the economics of contracted maintenance can still be justified for a single plant operation.

The maintenance operation in Sarnia has the whole-hearted endorsement of the A.F. of L. Building Trades from the local union level through to the national headquarters. In order to broaden the possible field for contracted maintenance with Building Trades personnel, the unions have formed the Ontario Plant Maintenance Council and have entered into a contract with Catalytic Construction of Canada Ltd., making uniform for the Province of Ontario the conditions under which they will perform these services in the Province. These cover shift conditions for round-the-clock services and overtime, holiday and Saturday and Sunday conditions which compare favorably with operating company conditions.

The operation of Catalytic in the plant of Canadian Oil Refineries Ltd. at Sarnia



is a representative example of contracted maintenance services. In the year 1954 the plant was in normal operation after the usual irregularities which occur in the start-up of a grass roots facility. During this year two major shutdowns were scheduled, and for the balance of the year no serious emergency or large scale plant revamp developed which required abnormal mechanical manpower. In this year, as shown in the accompanying chart, Catalytic supplied 75 men as a weekly average. In the two shutdown periods totaling nine weeks the average manpower supplied by Catalytic was 231, ranging from 135 to 282. For the balance of the year the contractor's force averaged 42 per week ranging from 20 to 95 men. Included in these figures are a number of men employed on minor capital jobs.

To measure the savings realized by contracted maintenance, an assumption must be made that by operating otherwise a certain permanent force would be employed. The question is how big should this force be? Because of the manpower peak during turnarounds, in no week in the above operation was either the 75 average for the year met nor the average of 42 for those weeks excluding the nine weeks during major shutdowns. Since the supply of manpower was carefully planned for maximum efficiency and immediate need, it appears that there were 29 weeks in the year in which 42 men in a permanent mechanical force would exceed requirements. In 23 weeks the excess woud be 20 percent of requirements.

The amount of savings in mechanical payroll by contracting for a major part of plant needs depends on the above mentioned assumptions which may be different for each organization. Unquestionably, savings can be realized if the service can be tailored to the plant's function.

In addition to the savings on current payroll, there are other positive but difficult to calculate savings which will be realized from a smaller permanent organization. These include the lessening of liability under company programs for pension and sick leave benefits.

It is indicated also from the operation of Canadian Oil that savings for the refinery have been achieved through the tool account. Since many special tools are rented by the contractor only for the period during which they are actually required, this limits the investment in the maintenance of tools the year around which are required for only a few weeks.

The Canadian Oil Company's plant at Sarnia now under expansion had a crude unit rated at 20,000 b/d; an 8,500-barrel fluid catalytic cracker; a 3,800-barrel Platformer; 4,000-barrel visbreaker; a gas recovery unit; cat poly unit; boiler plant and other utilities.

The contractor's resident engineer participates in the scheduling of shutdown work and assists in establishing the requirement for supervision and mechanical craftsmen.

Requirements for tools are determined from the scope of the work and these are furnished from the contractor's central toolroom in Sarnia or are procured at area rental rates.

When the project is underway, the work orders are furnished to the Catalytic supervisor in the same manner as a refiner's area maintenance foreman might receive job orders. In this manner the contractor acts as a completely flexible extension of the refiner's own organization.

The obvious difficulty of hiring qualified mechanics for relatively short periods of time directly by a refiner are averted. It is not unreasonable to assume that even if it were possible to obtain an unlimited supply of personnel for periods of varying length, those available would not be expected to have the degree of mechanical skill available through the Building Trades Council. The ability of a large engineering and construction company to mass men and equipment quickly to tackle a planned shutdown or emergency project can be gauged from some of Catalytic's "case histories" on projects in the Sarnia area.

George E. Temple, vice president and general manager of Catalytic Construction of Canada Ltd. offers the following abbreviated version of events that transpired in various plants in the area and rapidity with which manpower was mobilized:

1. Emergency refinery shutdown for a cat cracker about which we were informed at 10 p.m. on the evening of January 2. Four men were immediately put on the job to make the unit safe and on the following morning at 7:30 a.m. 120 men were present. This emergency shut-down was eventually scheduled into a major turn-around and on the 6th of January 200 men were on the job; on the 12th, 270 men.

2. Tower shutdown on the morning of September 12. Within three hours, 75 men were on the job. This shutdown was scheduled into a turn-around program and on September 14 a total of 164 men were on the job.

3. Cat cracker shutdown for December 15 was brought forward to December 5 by an announcement late in the afternoon of December 4. As requested, 40 men were on the job the following day and on December 10, a total of 128.

4. Refinery unit shutdown for normal turn-around commenced Friday, April 2, with 157 men on the job. On April 5, Monday, the number rose to 249. By April 9 this had increased to 302.

5. Scheduled refinery shut-down to retube heater. On March 12 at 8 a.m. the initial complement of 63 men was present on the job. At 4 p.m. of the same day the number had increased to 170. During the same afternoon the emergency shutdown was scheduled into a major turn-around, and by 10 a.m. the following morning 254 men were on the job.

6. Refinery emergency shut-down because of coke deposit on reactor catalyst. A normal complement of 71 men was on the job Friday, August 27. On Monday morning August 30 a total of 161 were present. This number was increased to 203 on September 1.

7. Tower developed a crack ⅓ of the circumference of the 160-foot elevation. The vessel was constructed of 1⅜-inch plate. It was welded, X-rayed, local stress relieved and reinforced. This job was started on September 17 and completed October 7 by working 24 hours per day.

8. Refinery determined to bring a small unit down at 3 p.m. for emergency repairs and by 6 p.m., 25 additional mechanics were hired and working on a shift basis.

9. A fire in reformer on Sunday. At 8 a.m. Monday, 43 mechanics are added to the rolls to remove burned insulation, repair brick-work, remove banks of burned tubes, repair twisted steel work of heaters, remove and screen catalyst of reactors and repair reactor linings. Piping set up for acid washing of heaters after new tubes had been installed, stress relieved and hydrostatically tested. Work performed on a two-shift basis was accomplished in 1,500 man hours.

Mr. Temple points out that among the factors contributing to the good performance record at Sarnia is the favorable labor supply situation. "When considering the potential requirements of any plant in this area for emergency purposes, the character of this area must be taken into consideration.

"Statistically, Sarnia is the fastest growing city in Canada and has a greater investment in large technical industry per head of population than any other city in Canada. These two important factors alone suggest an area to which people are naturally attracted and where we have, in effect, an actual surplus of skilled personnel throughout the year."

The Ethyl Corporation of Canada Ltd. is building a plant in Corunna just south of the Canadian Oil's refinery for the manufacture of tetraethyl lead. It has been announced that the maintenance work in this plant will be contracted for with Catalytic Construction of Canada Ltd.

Amicable labor relations are an important factor in carrying out projects of this type in the least possible time. In discussing this phase, Mr. Temple points out that since the cessation of major construction work at Sarnia, Catalytic's employment roster has not dipped below 120 in the area.

"This number is employed on a fairly permanent basis. We have the telephone number and address of each man so that if an emergency occurs we can immediately reach each foreman of the craft required. He, in turn, musters the men he needs for the job.

"If the number of men available by this method is under our requirements, we then contact the business agents directly. To date, the business agents have never failed to put out maximum effort to obtain the men required. In some cases the labor unions went so far as to supply men from London, Ontario and Toronto."

Above are the newly elected officers for 1956 of the Association of Desk & Derrick Clubs of North America. Seated, left to right: Esther Welch, treasurer, Pioneer Natural Gas Co., Amarillo, Texas; Irma Cline, second vice president, Nelson, Montgomery, Robertson & Sellers, Wichita Falls, Texas; Edna Hurry, president, Standard Oil Co. (N. J.), New York; Lydia Babka, first vice president, Honolulu Oil, San Francisco; Betty Van Kuyk, secretary, Socony Mobil Oil Co., New York; Sybil Sureck, president 1955, Union Oil Company, Oklahoma City; and Laverne Montgomery, Region V director, Rocket Petroleum, Lubbock, Texas. Standing, left to right: Zetta Belle Housely, Region VIII director, Shell Chemical, Wilmington, Cal.; Anita Lang, Region VI director, Phillips Petroleum, Ardmore, Okla.; Margaret Sevier, Region IV director, Delhi-Taylor Oil, Corpus Christi, Texas; Ellen Vaughan, Region III director, Carter Oil, Shreveport, La.; and Edith Snizek, Region I director, Rand McNally, New York. Missing from picture: Edda Eldridge, Region VII director, Utah Southern Oil Co., Salt Lake City; and Harriett Gregath, Region II director, Tide Water Assoc. Oil Co., Kansas City.

Desk & Derrick Club Convention Elects Officers

EDNA HURRY, office manager of the Standard Oil Company (New Jersey) public relations department, was elected president of the Association of Desk and Derrick Clubs of North America at the association's September 2 and 3 convention in New York City. Other officers elected from a double slate were Lydia Babka of San Francisco, first vice president; Irma Cline of Wichita Falls, Texas, second vice president; Elizabeth Van Kuyk of New York City, secretary; and Esther Welch of Amarillo, Texas, treasurer.

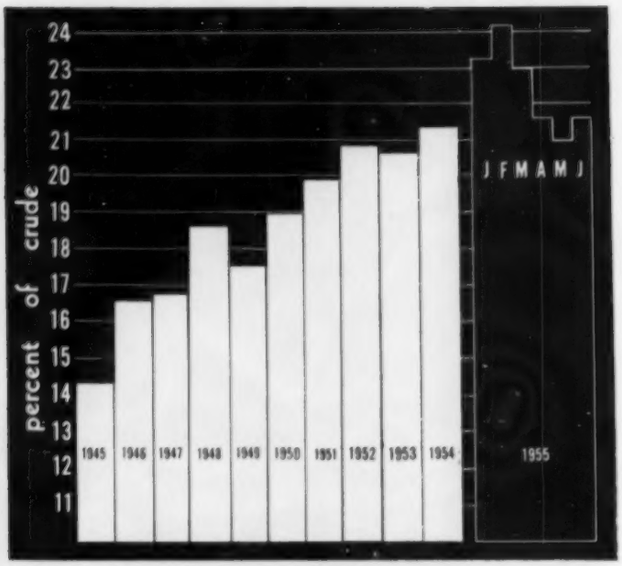
Attending the New York City convention were about 900 women employed in the petroleum industry from 90 of the 105 Desk and Derrick Clubs in the United States and Canada. ADDC has about 9,000 members. The attending delegates voted to hold the 1956 convention on September 7 and 8 in New Orleans.

Awards were given for outstanding work during the past year. First place in the Best-All-Around Bulletin Division of the 1955 Member Club Bulletin Contest conducted by the ADDC was awarded to Lise Tescher, Editor of *Swivel Squeaks*, Denver, Colorado. Miss Tescher is affiliated with Calvert Drilling, Inc., Denver. Honorable mention in the same division was given to Helen Jones of Esso, Bernice Paris of Halliburton Oil Well Cementing Co., and Margaret Frisken of McColl-Frontenac Oil Co. Ltd.

In the Best Writing Division, first place went to Regina Glasco, of the Sun Oil Co. of Toledo, Ohio for an article titled "Magic in Crude Clothing" published in *Drills and Frills* of the Toledo Club. Honorable mention was given to Stella D. Condry of Plymouth Oil Co., and tied for third place honors were Anita Lang and Bernice Paris, of Phillips and Halliburton companies respectively.

In the Best Drawing Division, first place went to Thelma Broackman of Richfield Oil for the cover of *Desk and Derrick Diggin's* published by the Shreveport Desk and Derrick Club. Honorable mention in this division was given to Loretta Todd, Bobbe Jean Shehorne, and Margaret Wright of Carter Oil, Halliburton and the U. S. Bureau of Mines respectively.

The delegates enjoyed a fast round of parties, tours and talks during the two and a half days of convention. Tours ranged from Manhattan's Chinatown to three of New York's best nightspots. Talks went from an address by Mrs. Helen Valentine, Editor-in-Chief of *Charm* magazine to automation in offices and its probable good effects on lady office workers by Mr. David A. Shepard, a director of Standard Oil Co. (N.J.). Other speakers included the former deputy secretary of Defense, Robert B. Anderson, and opening addresses by Eunice Wilder and Admiral H. B. Miller of OIIC, plus a keynote speech by Irene Stimson Cox, past president of ADDC.



Yields of middle distillates from crude oil at United States refineries have increased 50 percent since the close of World War II.

Refining industry moves to meet growing natural gas competition with cooperative program to

BOOST MIDDLE DISTILLATE SALES

In 1952, 27,000 fuel oil burners were removed from homes in the United States and replaced by gas burners.

In 1953 gas competition took 43,000 customers away from fuel oil burners.

In 1954 additional burner customers lost to gas totaled 50,000 and losses to gas this year may reach 75,000 burners.

Since domestic oil burners consume an average of about 1,500 gallons of middle distillate fuel oils per year, the losses to gas are attaining serious proportions. In the coming heating season the market would be greater by five million barrels had there been no losses to gas in the past three years.

Oil refiners are increasingly aware of the situation and have begun to do something about it.

For the first time in nearly 30 years the refining industry has undertaken a comprehensive program of assistance to domestic fuel oil distributors calculated to increase consumption of these middle distillates.

Beginning early this year refiners set up a market survey organization as a cooperative enterprise under the name Oil Heating Market Reports. Offices were opened at 270 Park Avenue, New York City, under the guidance of Robert Gray, editor of *Fueloil and Oil Heat* magazine.

First venture of Oil Heating Market Reports was to survey the market in metropolitan Boston. When the study was completed, a local group was organized in the Boston area to undertake a cooperative advertising and promotion campaign in the interests of middle distillate fuel oil consumption. The local organization is known as Better Home Heat Council, Inc. Both refinery suppliers and local distributors were invited to support the campaign. A local advertising and publicity firm was employed to develop the program. A sample of the advertising published in the Boston area is reproduced with this report.

In 1953 gas utilities in Boston spent $75,000 to advertise gas heat. In the city itself the oil industry had no organized competitive reply. In the entire metropolitan area there were only three small communities in which distributors pooled their resources and spent a total of $6,000 to advertise middle distillate fuel oil.

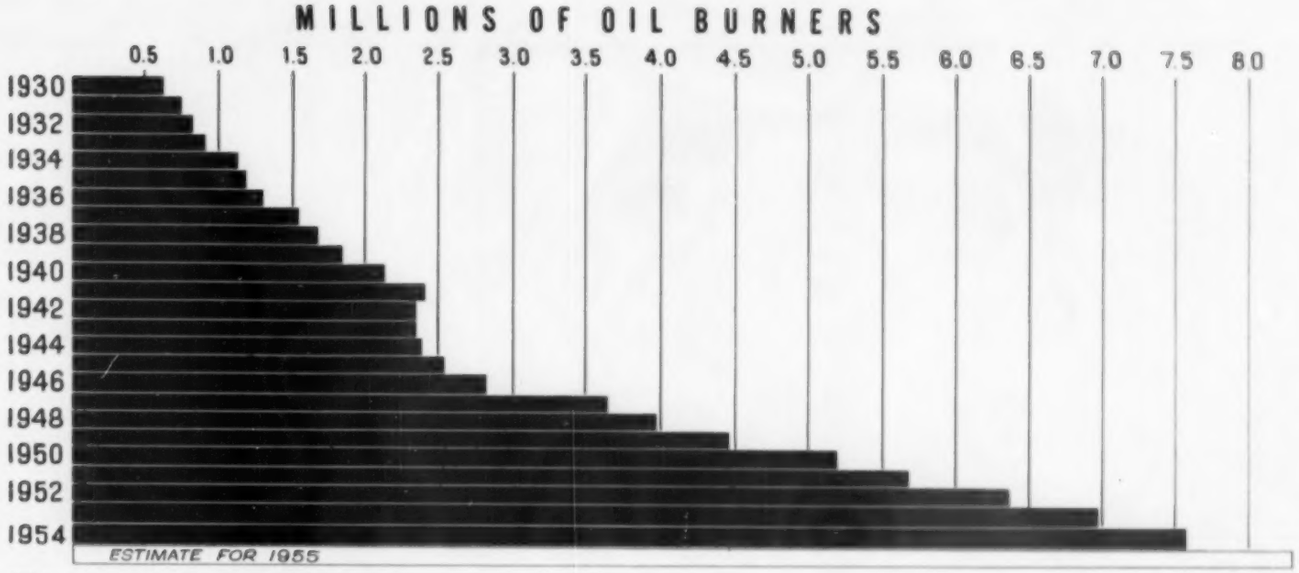
Boston was selected as a place to start by refiners because it has been a rich oil market for many years and natural gas is a newcomer. The research organization found, as a result of its study, that there was a gain of 26,933 oil burners in greater Boston in 1954 compared with a gain of 12,500 gas burners.

At the beginning of this year, there were 375,762 No. 2 fuel oil users in Boston. In the 1953-54 heating season, residences heated with oil consumed an average of 1,550 gallons each. Small flats and business buildings heated with light fuel oil consumed 3,864 gallons per burner. Average of both groups was 1,689 gallons. That season was 10.8 percent warmer than normal. In a normal year, the research group calculated that the greater Boston market should be about 17 million barrels.

It was found that oil has a good competitive position pricewise. Anthracite coal costs $26.50 per ton or 11 cents per therm (100,000 Btu). Mixed gas costs 13.75 cents per therm and natural gas 14 cents per therm. Domestic fuel oil costs 10 cents per therm.

With this ammunition before them and the real importance of the market revealed, Boston distributors and their suppliers budgeted a campaign to cost $150,000 for the coming season. As early as May the four principal suppliers and distributors, who sell 40 percent of the oil consumed in Boston, had joined Better Home Heat Council, Inc. and about $75,000 had been pledged for the local cooperative advertising and promotion campaign.

Since the national research organization was set up earlier in the year, 32 cities have been surveyed. Three states have been



Oil burners in service are expected to increase about 700,000 this year to 8,272,000. Estimate is based on first half sales which were 10 percent higher than in the first six months of 1954.

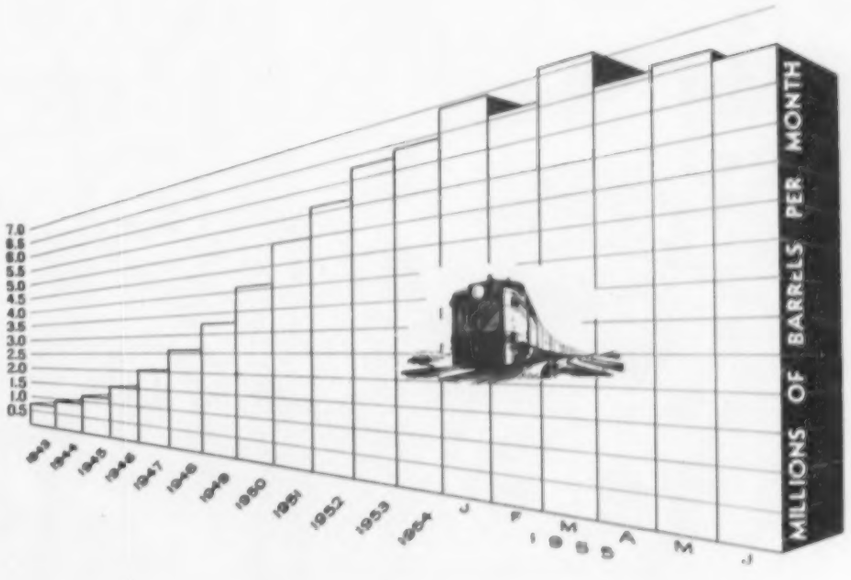
completely studied. In 20 of the individual markets in which reports have been compiled, local groups of distributors have been formed and promotion plans adopted. In every case the local organizations are autonomous. They select their own local advertising agencies and control their own program which is specifically tailored to their own competitive situation.

For a good many years middle distillates were considered a more or less necessary evil by refiners. It was not feasible to crack the fraction to extinction and market prices were not high enough to make production of larger percentages attractive. In 1939 the average yield of middle distillates was 13 percent and gasoline 45 percent. Residual fuel represented 25 percent of the barrel of crude oil.

At the close of the war in 1945 distillate yield was 14 percent and residual fuel 27 percent. Total sales of distillates were 232 million barrels. Each year since the war distillates have taken a larger portion of the barrel of crude. Gasoline yield has been steady, the growth in consumption being met by increased runs to stills. Last year distillate yield was 21 percent and this year it probably will approximate 23 percent. Residual fuel percentage will be about 16.

The higher regard for distillate fuels on

United States railroads now are consuming about 6,500,000 barrels per month of diesel fuel. The rate of increase has tended to level off as railroad dieselization has neared completion.



"SYMBOL OF SAFETY." This is the seal of your Better Home Heat Council. 700 friendly, independent automatic oil heat dealers who are on guard to service you day or night for the safety and comfort of your family.

Safe and snug

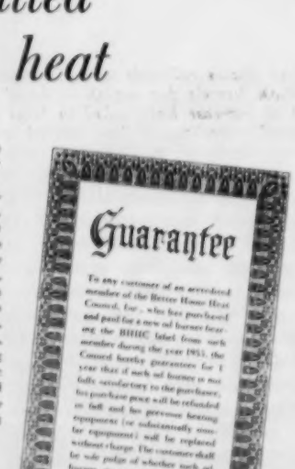
...daddy installed automatic oil heat

The day's play leaves its imprint deep in a little child, and dull in arm, she sleeps with utter faith in tomorrow's fun.

Frankly, a child doesn't care what kind of heat daddy and mommy installed. She just likes the warm, cozy feeling she gets when she comes in from play. She's happy too, that all the shaking and noise daddy used to make in the basement doesn't frighten her at night any more.

Mom's in the kitchen still washing off the finger print gallery left on the woodwork. But mom doesn't mind. Since Jim (that's daddy's other name) put in Automatic Oil Heat her work around the house is a lot easier. Her curtains stay cleaner longer, there's less dust around the house, even her plants grow healthier.

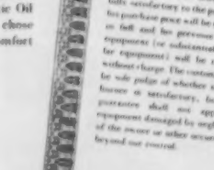
But let's not forget dad — he's happier with Automatic Oil Heat, too. Fuel bills are lower and he knows he can depend on Automatic Oil Heat to give him safe, comfortable, dependable heat. That means a lot to any father, but even more to Jim. He's a salesman and away from home a lot. He needs a heating system he can depend upon, one that is completely automatic, that's why after carefully weighing the advantages of all the automatic heat systems, he chose Automatic Oil Heat. Jim says, "I'm happy I chose Automatic Oil Heat. I get comfort without worry."



a million dollars guarantees

"You'll be happier with automatic oil heat"

Every month Metropolitan Boston invests a million dollars in new equipment for automatic oil heat . . . what better guarantee of satisfaction!



Better Home Heat Council, Inc.

Sample of advertising published in the Boston area by a local organization, Better Home Heat Council, Inc., to promote middle distillate fuel oil consumption.

the part of refiners may be attributed largely to the improvement in price which has accompanied the very rapid rise in postwar demand. In an address before the marketing division of the American Petroleum Institute last November, J. E. Dyer, president of Sinclair Refining Co., pointed out that the refinery price of distillate has risen 164 percent in the past 15 years compared with a rise of 107 percent in gasoline. Crude prices in the same period rose 163 percent. The price rise was a reflection of the 265 percent growth of distillate demand in a period when gasoline consumption was expanding by only 122 percent.

Last year when gasoline markets dropped as a result of stock accumulation, distillate markets did not decline as sharply. Average price of 86 octane gasoline in barge lots in New York harbor was 12.50 cents per gallon in 1954, according to *Platts Oilgram*. This was a drop of 0.62-cent per gallon from the 13.12 cents average in 1953. No. 2 fuel oil price at New York averaged 9.31 cents per gallon in 1954 compared with 9.68 cents in 1953. The drop of 0.37-cent per gallon in distillate markets was only about half that suffered by motor fuel.

Due to the general business level in the United States, gasoline demand in 1954 showed an increase of only 2.7 percent. Under the same economic conditions, distillate sales rose 7.6 percent. The increase in sales for heating purposes was 14.2 percent.

Distillate sales this year probably will total 563 million barrels, an increase of seven percent over 1953 and of 143 percent over 1945.

Diesel fuels have been an important contributor to the growth in distillate sales. Dieselization of the railroads has increased demand from rail carriers by about 500

DOMESTIC SALES OF DISTILLATE FUELS
(Millions of Barrels)

Year	Railroads	Heating	Others	Total
1955 Est.	83	338	142	563
1954	77	305	144	526
1953	75	267	147	489
1952	68	263	148	479
1951	60	250	139	449
1950	49	221	125	395

percent in the past decade. Distillate fuel has had a rise in demand of about 180 percent in the same period. Marine and utility demand had been largely unchanged.

Railroads in the United States again have increased their orders for diesel locomotives after a lull in 1954. On August 1 this year 467 units were on order compared with only 123 a year ago. The total still is far less than in 1952, however, as indicated in the following tabulation:

DIESEL LOCOMOTIVE UNITS ON ORDER

	AUG. 1	AUG. 1	AUG. 1	AUG. 1
Type	1955	1954	1953	1952
Passenger	47	4	62	105
Freight	244	96	170	744
Pass. or Ft. ..	—	8	8	68
Switch	176	15	244	512
Totals	467	123	484	1,429

Within the past 12 months, ending August 1, 1955, railroads have added 896 locomotive units to their diesel fleet compared with 1,461 in the year ended August 1, 1954. Details are given below:

DIESEL LOCOMOTIVE UNITS IN USE

	AUG. 1	AUG. 1	AUG. 1
Type	1955	1954	1953
Passenger	2,359	2,340	2,263
Freight	12,069	11,471	10,361
Pass. or Ft.	1,104	1,075	990
Switch	8,816	8,459	8,377
Total	24,348*	23,452	21,991

* Nine units were in storage on August 1.

Railroads in the United States now are approximately 90 percent dieselized. In May of this year diesel locomotives hauled 84.82 percent of the freight, 88.30 percent of the passengers, and did 90.92 percent of the yard work for Class I carriers. Oil-fired steam locomotives carried 1.54 percent of the freight, 1.99 percent of passengers and did 1.15 percent of yard switching.

There were 25 gas turbine-electric locomotives in service on August 1. These locomotives have been proposed on the theory that they can burn cheaper fuels. However, recent experiments have suggested that diesel engines also can burn heavier oils in commercial service without an undue increase in maintenance costs.

In the first six months of 1955 railroads consumed 40,377,000 barrels of diesel fuel compared with 37,274,000 barrels in the first half of 1954 and 36,806,000 barrels in the first half of 1953. Increase this year has been 8.35 percent compared with 1.26 percent a year ago when railroad operations were depressed.

Using locomotive units in service as of August 1 each year, a number which is, of course, somewhat larger than the average in service, diesel fuel consumption this year is running at the annual rate of 3,320 barrels per unit. This compares with 3,280 barrels per unit in 1954 and 3,490 barrels per unit in 1953.

There has been little change in refinery shipments of light diesel fuel for automotive and other purposes outside the railroad field. In the first half of the current year deliveries totaled 44,433,000 barrels compared with 43,813,000 barrels in the same period in 1954. Increase was only 1.4 percent.

Domestic fuel oil distributors and sellers of home oil burners enjoyed a very good year in 1954 and are quite happy again this year. One reason was the weather, which was colder during the past heating season. Also the margin between fuel oil cost and selling price was wider and competitive price cutting did not disturb retail markets unduly. Meanwhile oil burner sales were excellent; enough to provide a large increase in gallonage despite the competition of other fuels, particularly natural gas.

Fueloil and Oil Heat magazine reports 738,048 new oil heating installations during 1954, providing a net gain of 564,364 domestic fuel consumers after adjusting for replacement of worn out burners and losses to other fuels.

Installations in 1954 were about 10 percent lower than in 1953 largely due to a drop in conversions from coal to oil. This is a trend which will continue as fewer and fewer coal furnaces remain to be changed to oil. Comparative figures for 1954 and 1953 are given below:

OIL BURNER INSTALLATIONS IN THE UNITED STATES

	1954	*1953*
New Homes	317,355	323,582
Replacements	118,080	104,567
Conversions	302,613	395,216
Total	738,048	823,365
Losses to other fuels ..	55,604	47,065
Total units in place at year end	7,581,973	7,017,609

In the first half of this year *Fueloil and Oil Heat* reports a 10 percent increase in installations. Total for the six months was 294,003 compared with 267,334 in the first half of 1954. Since second half installations are normally three times as great as in the first half, it is estimated that 1955 installations will total 875,800 of which about 700,000 will be added to the number in service last year, bringing the total in use to roundly 8,282,000. Losses to other fuels are estimated at 75,000 and replacements of old burners at 100,000.

Average consumption in the United States of fuel oil per burner in the 1954-55 season was 1,522 gallons compared with 1,450 gallons the previous season. This reverses a trend which has been apparent during the past 10 years.

Prewar burners consumed in excess of 2,000 gallons per year on the average. In 1951 per burner consumption had shrunk to 1,638 gallons, in 1952 to 1,505 gallons, and in 1953 to 1,450 gallons.

The reversal in trend was more apparent than actual, however. Average temperatures in the United States were 8.3 percent below the previous year and the increase in consumption per burner was five percent. Smaller homes, better insulation and more efficient burners are tending to reduce fuel oil consumption year after year. It has been observed also that a 10 percent decrease in ambient temperatures does not add 10 percent to fuel consumption. This is true because oil burners are more efficient when operated at high capacity.

The colder weather last year did add perhaps 80 gallons per burner to distillate fuel consumption last winter, amounting to a total of some 14,400,000 barrels, nearly half of the actual increase in sales.

As the heating season approaches, the oil refining industry appears to have adequate stocks on hand to meet early season requirements. Flexibility of refinery operations at most modern plants is such that extraordinary demand caused by subnormal weather can be met quickly. Transportation facilities are adequate to move large quantities to market rapidly.

Distillate fuel stocks at refineries, at bulk terminals and in pipe lines totaled 141 million barrels on Sept. 16. On the basis of an average consumption of 1,500,000 b/d, current stocks represent 94 days supply. In addition, the supply of oil in home tanks and in the hands of distributors in September is normally adequate to take care of an early cold snap. Both refiners and distributors are ready and willing for another cold winter.

Nerve center of an enterprise that may well turn the sleepy Indian village of Yacuiba into a boom-town is the McCarthy headquarters building above.

Transfer of half interest in McCarthy concession to New York syndicate will provide funds for developing Los Monos and testing Agua Salada structure.

BOLIVIAN CAMPAIGN TO

R. B. Keljikan, president of the Keljikan Commercial Corp., and head of the syndicate buying into the McCarthy Bolivian concession.

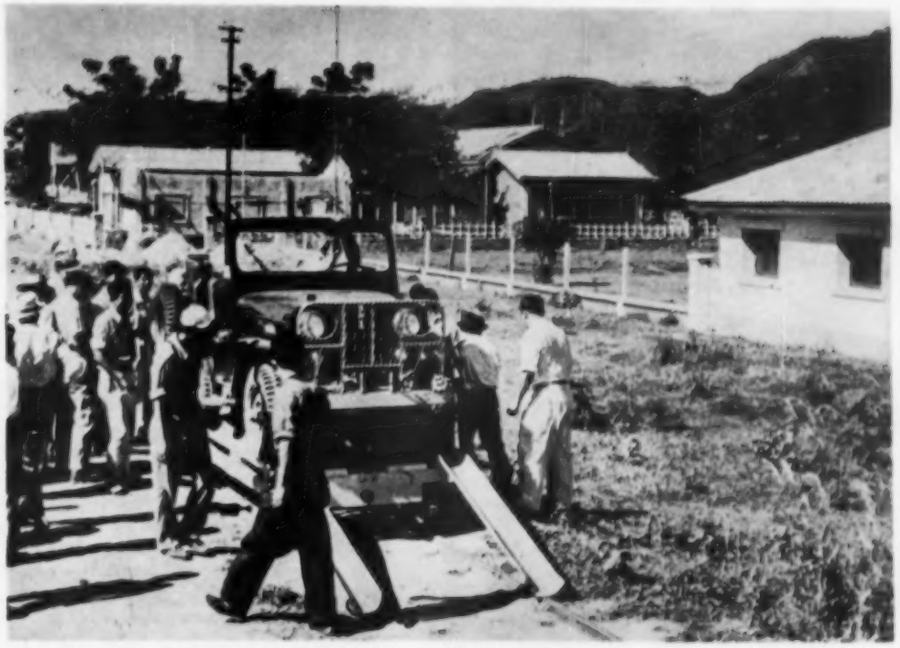
UNITED STATES government guarantees against expropriation and currency inconvertibility in Bolivia are expected shortly by Glenn McCarthy, Inc. Once these guarantees are received and Bolivia's permission is granted, a half interest in the McCarthy concession in Bolivia will be transferred to a New York syndicate headed by Robert B. Keljikan, head of the Keljikan Commercial Corp.

Although the agreement was signed June 20, 1955, the transfer of interest is not complete until McCarthy has received the U.S. government guarantees. These are expected, according to the syndicate, before October 2. Permission of the Bolivian government to the transfer must also be obtained. When these are received a half interest in future sales from the concession, as well as the two drilling rigs and materials already installed there will pass to the syndicate. In return, the syndicate will provide a total of $2,250,000 over a 17-month period for development of the Los Monos anticline and two exploratory wells on the untested Agua Salada structure to the south. Mr. McCarthy has stated that the amount will approximately match his own investment to date. The syndicate investment will be supplemented later by reinvestment of earnings to a total slightly over four million dollars.

Under the new arrangement the operating control will remain pretty much with McCarthy, who is given the right to direct and control operations for exploration, production and sales of all crude or gas produced. The syndicate will have effective representation, however, on the board of the American company, Glenn McCarthy de Bolivia, S.A.

Joint control over expenditures, commitments and sales will be held by a Keljikan representative. Operations of the lease will be conducted according to the terms and conditions of the standard Mid-Continent Operating Agent, adjusted to conditions of foreign operations such as increased royalty, etc.

Expenditures by the syndicate are tied to a development program for the Los Monos structure covering 17 months. On obtaining the government guarantees and consent mentioned earlier, Mr. McCarthy will receive from the syndicate $380,000. This will be used, according to McCarthy, to



This Oil Country Cadillac is a unique Jeep-powered rail car especially developed for the McCarthy expedition. Getting on the track at Yacuiba, the vehicle speeds over the narrow-gauge rails through the lease at 45-50 miles per hour driven by the Jeep's power take-off. At San Antonio, 16 miles from the drill site, it is detached from the rail car and driven as an ordinary Jeep.

BROADEN

install a 500 b/d feeder line to the pipe line owned by the Bolivian Government about 15 miles away. The latter runs from the Camiri field in central Bolivia south to Yacuiba on the Argentine frontier, a distance of about 170 miles. According to reports, work is to begin imediately in Argentina on a 1,000-mile pipe line linking fields south of Yacuiba with ports on the River Parana and thence to Argentine refineries and markets. This pipe line, plus truck transportation to Paraguay and rail shipments to Brazil, would comprise the concession's market outlets.

Following completion of the mentioned feeder line, the agreed development plan calls for financing at the rate of $110,000 per month, covering two wells per month over the next 14 months, making a total of 28 wells. Two of these are to be drilled on the Agua Salada structure to the south following completion of a gravity survey about November 1955. The remaining 26 wells will be step-outs from the Los Monos discovery. In its calculations of probable income from the concession the syndicate has assumed 20 of these would be productive, at about 200 b/d or the same rate as was obtained from the initial discoveries.

Receipts from the sale of production obtained are to be the source for future development funds of the concession. This is not contained in the agreement but is a verbal understanding, according to the syndicate. Assuming 20 producers, a total production of 4,000 b/d would be obtained. The syndicate's calculations show that after deduction of 16½ percent royalty plus 3½ percent for development costs there would remain 3,200 b/d. Marketing of this oil is assumed at U.S. $3.85 per barrel. Deducting pipe line charges of approximately 10 cents per barrel, the net return would be in the neighborhood of $4.3 million yearly, according to the syndicate. Of this amount $1,900,000 is to be set aside for future development. The remainder would presumably be divided among McCarthy and the syndicate.

Terms of the original McCarthy contract: the concession contract into which the syndicate is buying was obtained September 26, 1952. It will be remembered that this was during the period of relaxation of control by Yacimientos Petroliferos Fiscales Bolivianos (Y.P.F.B.), which is the government's petroleum agency. During 1951 a section of land from about Camiri southward to Argentina was opened to contract by foreign operators. Later these privileges were removed during a period of greatly increased production by Y.P.F.B. with new finds at greater depths in Camiri. The McCarthy contract was later amended on February 2 and May 11, 1953, becoming effective May 26, 1953.

The contract runs for 35 years and covers 970,000 acres in the Gran Chaco province of Bolivia, nearly touching the border of Argentina. The total area must be reduced by 25 percent, which may be selected by McCarthy, during the first two and one-half years from the effective date or by November 26, 1955. An additional 25 percent reduction must be accomplished within five years of the effective date. Provision is contained for surrender by McCarthy at any time. Provision is also contained, according to reports, for expropriation by the government, should it see fit.

Royalty is payable in kind on a scale ranging from 16.5 percent on production per well of one to 200 b/d and ranging

(Continued on page 70)

Growth of fluid coke production spurs utilization research

COMPLETION of the second commercial fluid coking unit by Esso Standard Oil Co. at its Baltimore refinery early in September and the other plants at widely scattered locations has focused interest on methods of coke disposal.

The two plants now operating have a combined coke producing capacity of 350 tons per day and five other plants under contract or building will have an aggregate capacity of nearly 1,400 t/d. Included in this group are two cokers for Tide Water Associated Oil Co. and one each for Aurora Gasoline Co. and Canadian Petrofina, Ltd. In addition Esso Standard is planning an 800 t/d plant for erection at Baton Rouge, La., and Pontiac Refining Co., Hattiesburg, Miss., and Bankline Oil Co., Bakersfield, Calif., have signed license agreements. Utilimate capacity of the plants running, building or planned is about 2,500 t/d. This compares with a present U.S. production of about 10,000 t/d of petroleum coke.

Product of fluid cokers is quite different from conventional petroleum coke. It consists of rounded particles of a relatively narrow size range. Particles are hard and resistant to attrition. The coke pours freely and is very clean as compared with most carbonaceous materials.

Esso has been conducting research in a number of areas of possible consumption in addition to the base load which is expected to be for combustion. Studies have been made of metallurgical uses, for production of calcium carbide, phosphorus and carbon tetrachloride. For metallurgical uses briquetting, desulfurization and calcining are necessary. Studies are in progress on these problems. There is considerable incentive for development of methods of preparing fluid coke for metallurgical purposes since the market now has reached 70 million tons per year.

One possible use for fluid coke is as a substitute for low volatile coal required in the charge of a by-product coking oven. In the United States low volatile coals are high in price and being produced in decreasing volume. Early tests indicate that fluid coke improves the mechanical properties of blast furnace and foundry coke.

Fluid coke appears to be about as easy to burn as low volatile bituminous coal in conventional boiler furnaces. Auxiliary fuel such as oil or high volatile coal has been used to bring fluid coke up to ignition temperature and to help maintain a stable flame. Auxiliary fuel equal to 15 to 30 percent of the total has proved satisfactory.

Prior to completion of the Baltimore coker 1,000 tons of fluid coke were shipped from the Billings, Mont. plant of Carter Oil Co. to an eastern public service company for testing. Commercial runs on this coke appear to have been satisfactory with the result that an early announcement is expected from the consumer that it will purchase output of the Baltimore unit.

Tests have shown that in firing fluid coke the unburned carbon represents the major part of the solids withdrawn from the furnace. With coals, however, an additional 10 percent or thereabouts of ash also goes out of the system. For comparable total solids loss in combustion, fluid coke could afford to have up to say 10 percent unburned carbon. Since the heating value of fluid coke will be in the neighborhood of 14,000 Btu/lb., the net heat available even with higher unburned carbon compares favorably with run of the mine coal, such as is normally fed to large-scale boiler furnace installations.

Fluid coke can be satisfactorily ground employing either an impact-type mechanical mill, or a jet attrition-type of grinding. With a ball mill, if conventional coal grinding costs are taken at 25¢/ton, the costs for grinding fluid coke would be about 60¢/ton.

As indicated above, it seems likely that grinding fluid coke to the same extent as is normally practiced with bituminous coal, 80-90 percent through 200 mesh, would give unburned carbons from the coke in the neighborhood of one to two percent. Where fluid coke is burned in a furnace equipped with efficient fly ash collection equipment, unburned coke can be recovered and returned to the combustion zone. This permits operating with a relatively high percent unburned carbon leaving the furnace, while the fuel efficiency corresponds to a much lower unburned carbon. Thus, a coarser coke size may be fired, with a corresponding saving in grinding cost. In fact, in some cases grinding may not be required.

Kaiser Engineers, a division of Henry J. Kaiser Co., Oakland, Calif., has studied the burning of fluid coke in rotary kiln operations at the Permanente, Calif. plant of the Permanente Cement Co. A 50-ton sample of fluid coke was obtained from the Carter Oil Co. at Billings, Mont. with the following analysis:

SCREEN ANALYSIS

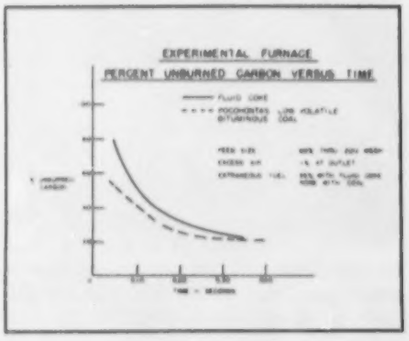
Screen Size	*Cumulative Percent Retained*
8	5.2
35	11.1
65	48.6
100	80.1
200	95.8

COMPOSITION

	Weight Percent
Carbon	89.1
Sulfur	6.0
Volatile (1742 F.)	3.8
Ash	0.16
Vanadium	0.03
Nickel	0.01
Net Heating Value Btu/lb.	14,300

At Permanente, there are five rotating kilns which are among the largest in the cement industry. These kilns are 450 feet long, 12 feet in diameter, and are inclined at ½-inch per foot. The average speed of rotation is 57 rph, with an average clinker capacity of 4,000 b/d each.

These kilns are normally fired with natural gas purchased from the local utility at an average of 948,000 cubic feet per hour. During the one or two extremely cold months each year, Bunker C fuel oil is used. Fuel is admitted to the kiln by a burner which extends eight feet into the discharge end of the kiln. The burning zone begins approximately 15 feet from the hood and is about 50 feet long. Primary air for



combustion is provided by 75 hp fans. It is in the combustion zone where the temperature reaches 2,900°F. that the majority of kiln reactions occur. The back end or feed end temperature of the kiln is approximately 700°F.

Because of the high plant production schedule, it was not possible to shut down the test kiln either to make modifications in the burner arrangement or to assist in the actual tests. This requirement made mandatory the use of existing 4-inch diameter oil burner housing and adapting it to handling coke in a high velocity air stream.

The fluid coke was transferred from a seven ton elevated bin fitted with a hopper bottom that connected directly to a 6-inch screw conveyor pipe. The conveyor screw was driven by a vari-drive unit with a speed range of four to one. Coke discharging from this conveyor was aspirated by compressed air through the special burner into a kiln. A maximum of 6¾ tons of coke per hour could be handled with this arrangement through the 4-inch burner port.

Preliminary runs were made burning the raw fluid coke as received without screening or grinding. The maximum firing used during these tests was about 3½ t/hr. delivered to the kiln with natural gas furnishing the balance of a necessary heat input. During these runs, each of which was about two hours duration, a drop out of large particles of unburned coke was observed which were later found in the analyzed test clinker.

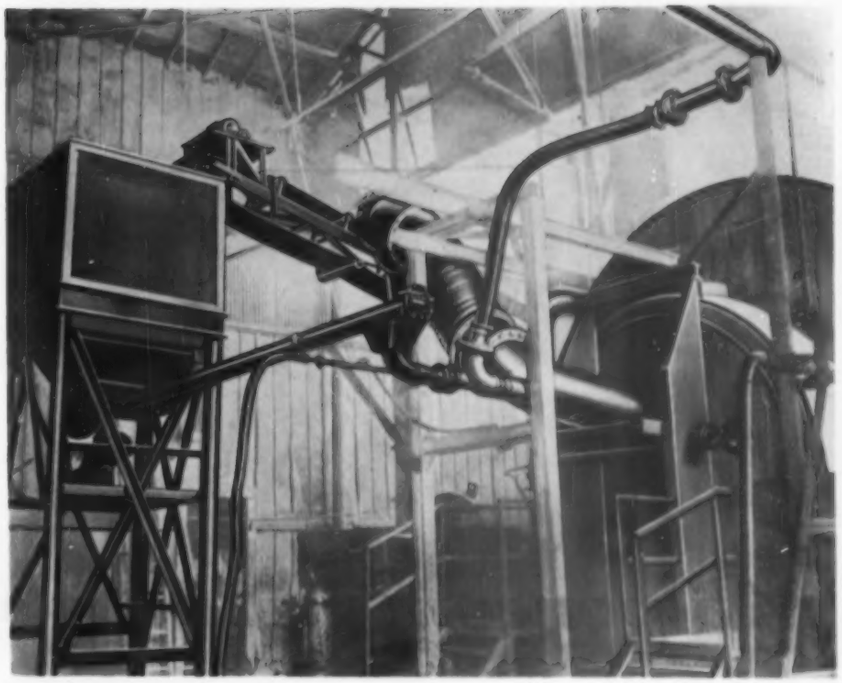
Because of the drop out of the larger particles, some of which were approximately ⅜-inch in diameter, it was decided that the coke should be ground to a more uniform size for subsequent testing. Accordingly, about 10 tons of the coke was ground, having the following screen analysis:

Screen Analysis	*Cumulative Percent Retained*
16	0
50	1.0
65	11.0
80	20.1
100	50.3
200	75.5

Weight of ground material: tamped, 63.4 lbs/cf.; loose, 55.7 lbs/cf.

Estimated cost of grinding was placed at 30 cents per ton by Kaiser Engineers.

A preliminary run with a ground coke was made with the input of primary air for coke combustion at 600 cfm and 80 psi, and with 50 percent natural gas as the auxiliary fuel. The color, shape of the flame, lack of fall-out, and ignition 10 feet beyond the nozzle indicated a performance almost identical with 100 percent gas flame. This test was followed with a commercial scale demonstration under similar conditions. In this test the 14,400 pounds of coke in the hopper was consumed in 1.2 hours. The maximum firing rate of 13,500 lbs/hr. was attained after a rapid build up of coke flow during which time the gas was reduced accordingly. Auxiliary firing of gas in reduced quantities was necessary to maintain input heat balance, but for several intervals of short duration the gas was turned off permitting the kiln to operate entirely on coke. The normal natural gas fuel consumption of this kiln is approximately 212 mcf/hr. with 1,100 Btu/scf gas or 233 million Btu/hr. Since the heating value of coke is 14,300 Btu/lb., about 17 percent of the normal gas flow was required to maintain the kiln temperature.



Hopper equipped with screw conveyor for feeding fluid coke to compressed air aspirated burner.

Sampling devices and other test equipment was set up well in advance of this demonstration in order to obtain the maximum amount of information during the test. Other than the temperature checks within the kiln itself, the sampling and testing was accomplished at both ends of the kiln: of the clinkers for any significant change in composition, and of the effluent gases for any significant change of analyses, particularly with respect to sulfur.

During the test the kiln temperatures rose from approximately 2,680°F. to about 2,800°F. and the back end or gas outlet end of the kiln rose from 680°F. to 705°F. The uptake draft was kept constant at two inches of water.

Samples of clinker were taken during the run which were analyzed as follows:

	Control	*Test*
SO_3	0.027%	0.034%
Free CaO	0.120	0.060
Ignition Loss	0.090	0.000

The bulk of the sampling and testing was conducted at the back end of the kiln, directed toward analyzing the kiln effluent with particular reference to the sulfur content and its accompanying dangers of air pollution.

A paper thimble was used to collect effluent dust. Sulfur compounds in the dust are in the form of both calcium sulfate at 16 percent and sodium potassium sulfite at 84 percent. Based on the rate of flow of 34.4 t/d and corrected for the control run, the analysis ran 0.97 percent S and was equivalent to 27.4 pounds per hour of sulfur.

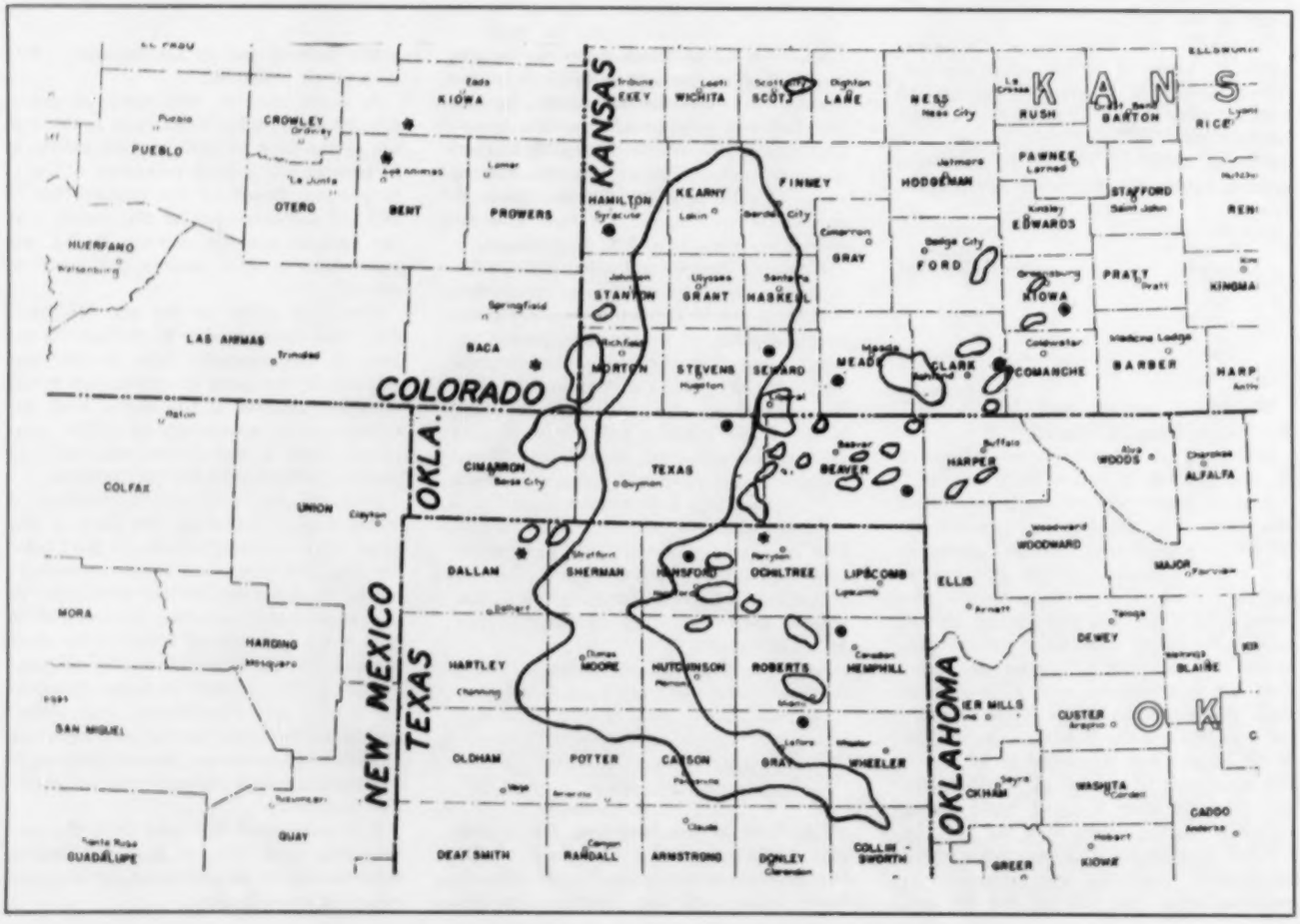
The total sulfur in the gas (H_2S and SO_2) was determined to be 33.2 pounds per hour. It was concluded from the test that the SO_2 in the gases of combustion reacts with the alkaline in the slurry feed, resulting in the appearance of sulfur compounds both in the clinker and the dust particles collected by the precipitators.

From the test data and observations, it would appear that if all five kilns of this plant were operating wholly on fluid coke, the total sulfur released to the atmosphere would probably be on the safe side, or not objectionable, assuming there is a 50-50 split of the sulfur being found in the stack gases and in the dust collected by the precipitators. The amount of sulfur found in the clinker was insignificant. Any reduction of the total coke burned or a reduction of sulfur below the six percent analysis of this sample would minimize the air pollution problem.

It is understood that coke from the new Baltimore fluid coker of Esso Standard is to be burned by an eastern utility company under its steam boilers.

45 percent wildcat success sparks

Oil and gas fields in the Hugoton Embayment-Anadarko Basin area.
** Indicates approximate location of new gas well.*
• Indicates approximate location of new oil well.



new PANHANDLE BOOM

THE FIRST HALF of 1955 has proved out an indication first manifested late in 1954—a new oil and gas "boom" is under way in the Hugoton Embayment-Anadarko Basin portion of the Panhandle area. This 50,000-square-mile region is experiencing the most intensive exploratory campaign in its history. More than 70 rigs are currently active in Pre-Permian operations, almost half of them wildcats. Operators in the five-state area of Texas, Oklahoma, Kansas, Colorado and New Mexico are taking part in the play, which is beginning to open widespread new production in what once was considered a well-defined producing province.

Panhandle oilmen, who were asking "what next?" as 1954 closed on the most successful exploratory year in area history, have changed the question to "what now?" The first half of this year witnessed the completion of the first Ellenburger producer in the Texas Panhandle, more than 200 miles south of a comparable well which last year established first Arbuckle pay in western Kansas. These two Ordovician strikes open production from the last geologic system expected to produce in the Basin-Embayment province.

In addition, a host of formations in the Permian-Pennsylvanian-Mississippian systems have yielded production at widely separated points over the region, indicating multi-pay possibilities throughout much of this 50,000 square miles. A good measure of the success operators have had in opening new fields, new pay zones, and extending production at outpost locations is the 45 percent discovery ratio thus far in 1955.

The answer to "what now?" soon may be revealed in a second oil and gas boom approaching the one 30 years ago, which saw the Panhandle field start development as one of the gigantic oil fields in the Western Hemisphere, and which started the Hugoton field on its way as the world's largest gas field.

Boom signs already have made their appearance. In spite of a five-year drouth disastrous to the cattle-wheat economy of the Panhandle area, its cities are experiencing an unparalleled growth, a great deal of it attributable to oil. Amarillo, southern headquarters for oil operations, has reported an average gain of 1,000 residents per month for more than a year, and is in the midst of an extensive building program to handle demands for office and housing space. Shell Oil Co., Seaboard Oil Co. and Union Oil Co. of California have opened district offices in Amarillo during the last three months, and Kerr-McGee and the Chicago Corp. are reported planning new offices there. Sun, Cities Service, Phillips and Standard of Texas have increased office personnel in this same period of time, and are taking a very active part in exploration, all four holding new field discoveries to their credit.

Pampa and Borger, two other Texas Panhandle oil towns, also are feeling the effect of the new activity. Borger, long a service and equipment center, is noting rapid expansion of facilities, particularly those employing the fracture processes required in many of the newly-opened gas-distillate fields. Pampa, located on the edge of Basin activity, has become an operations base for exploration and drilling crews, and is continuing to add producing personnel to its permanent population. Fifty families directly associated with the oil business were placed in Pampa during May, and the first week in June brought an additional 55 families.

Like the Texas Panhandle cities, Liberal, Kansas, is staging a fast-paced building program to meet demands for residential and office space. Headquarters for activity in the northern portion of the Hugoton Embayment, Liberal is drawing the impact of operations resulting from the 40-odd new fields discovered within a 50-mile radius since 1953. Reflecting the importance of oil and gas reserves in this area are the permanent buildings recently erected by oil companies and service firms in Liberal.

The ever-increasing number of deep drilling operations is bringing in drilling contractors new to this region. Since the first of the year three such contractors, Coats, Noble and Loffland Brothers, have started operations in the Texas Panhandle, using rigs capable of penetrating the deep formations in the Anadarko Basin. Schafer Drilling Co. has opened a district office at Pampa, and has two rigs in the field.

Well log and mapping firms report a greater interest in Panhandle activity than at any time since the early days of the Panhandle field. Abstract companies confirm this interest in the heightened volume of lease transactions. Demand for Rinehart completion cards covering the Basin-Em-

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Staff article prepared by Rinehart Oil News Company.

bayment counties has been greater this year than the total of all previous years.

Perhaps most significant is the attitude of Panhandle operators, most of whom have seen previous "booms" fold as dry holes defined promising new fields. There is a definite feeling of optimism among Panhandle oil men that the region has arrived as a new oil province, and that present developments are just a forerunner of an unlimited future.

That this optimism is justified can be seen in a review of the highlights of 1955 exploration. Most outstanding is the Phillips Petroleum Co. No. 1-A Troy in Sec. 86, Block M-2, BS&F Survey, eight miles southwest of Miami in north-central Gray County, completed flowing 299 barrels of oil and 70 barrels of water per day from perforations at 11,220-290 feet to open the first Ellenburger production in the Texas Panhandle. This development came as a surprise to operators throughout the region, including Phillips officials themselves, since the well was scheduled for abandonment on completion of the final drillstem test—the one which flowed oil. Only one other Ellenburger test has been completed here since, a dry hole 2½ miles west, but Phillips has three other operations drilling for the deep pay in this Laketon field. One of these has established nine gas-distillate pay zones to date from Pennsylvanian granite wash, and has not yet topped the Ellenburger.

More recently, a rank wildcat in Bent County, Colorado, has become the center of attention in this vast region. The M.J. Stansbury No. 1 Cordes-Oberlander, ten miles northeast of Las Animas townsite in SW SW of Sec. 21-21S-51W, has assured production from Morrow on flow of 2,000,000 cubic feet of gas per day, and is reported testing oil and gas from a higher Pennsylvanian level. This wildcat established production on the eastern flank of the Las Animas Arch, geologic feature which separates the Hugoton Embayment from the Denver-Julesburg Basin, and is the first producer in Bent County. Location is about 16 miles southwest of a 1952 Kiowa County discovery which was completed as a 357,000 cubic foot Morrow discovery. With the exception of upper Pennsylvanian gas production established last year in the Baca County portion of the Greenwood field, these two wells are the only producers in southeastern Colorado.

About 65 miles southeast of the Bent County discovery is another rank wildcat Morrow strike, completed early in 1955 in Hamilton County, Kansas. The United Producing Co. No. 1 Frank Helfrich in SE SE of Sec. 6-25S-42W, 12 miles southwest of Syracuse, pumped 50 barrels of oil per day from perforations at 5,040-50 feet to open a new field 30 miles southwest of Morrow production in the Patterson field of Kearney County and 20 miles northwest of Permian production in the Hugoton field. One offset currently is drilling and another has been completed dry.

Another Texas Panhandle county this year drew its first producing well, a Cherokee oil discovery in northwestern Hemphill County, 20 miles southeast of nearest production in the Lips Ranch field of Roberts County and more than 50 miles from comparable production. The Sun Oil Co. No. 1 Dale Nix in Sec. 81, Block 42 H&TC Survey, 2¼ miles northwest of Canadian, flowed 28.08 barrels of oil on 4½-hour potential test of perforations at 9,615-9,794 feet to establish the Canadian Penn field. A well drilled two miles northwest has missed the discovery pay and is to test in Morrow before attempting Oswego completion.

Beaver County, Okla., scene of last year's spectacular exploratory play, this year has bettered its record with five field discoveries completed and three other testing for completion. Most important new field is the Northwest Mocane area, which has excellent flowing oil production from the Kansas City and Checkerboard lime zones in addition to a Morrow gas pay. Opened by the Cabot Carbon Co. and Oklahoma Natural Gas Co., No. 1 John C. Hodges, a 390-barrel producer two miles northwest of Mocane townsite in SW NE of Sec. 1-5N-24ECM, the field as yet has not been defined. Recent developments in eastern Beaver County promise an extension of the play into Harper County, where activity has been revived by a new Morrow discovery in the Laverne sector.

Kiowa County, Kan., this year stepped into the spotlight with a series of Mississippian oil and gas discoveries. The Pyle field, with four producers, was discovered by the Gulf Oil Corp. and Falcon-Seaboard Drilling Co. No. 1 Pyle, in NE NE of Sec. 16-29S-16W, completed pumping 304 barrels of oil per day from perforations at 4,664-76 feet. The Nichols field has two producers, and was opened by the Gulf and Falcon-Seaboard No. 1 Nichols, NE NE NW of Sec. 20-29S-18W, completed flowing 7,500,000 cubic feet of gas per day from perforations at 4,997-5,003 feet. The Soldier Creek field was discovered in SW SW NW of Sec. 24-29S-16W by the G-M-R Oil Company's No. 1 Piester, potentialed on pump test of 150 barrels of oil per day from perforations at 4,598-4,608 feet. Most recent discovery here is the Mullinsville field in SE SW NE of Sec. 11-28S-20W, where the M.B. Armer and N.C.R.A. No. 1 McKinley pumped 115 barrels of oil per day from perforations at 4,890-98 feet. The Mississippian play is spreading long distances in every direction, with three wildcats showing oil and gas and a number of new Mississippian tests starting operations.

Long the hottest spot in the Texas portion of the province, Hansford County has continued its discovery pace throughout the first half of 1955. The largest gas-distillate producer in the Texas Panhandle was completed here recently when the Sharples Oil Corp. and Baker-Taylor Drilling Co. No. 1 Boyd, 12 miles northwest of Spearman in Sec. 5, Block 2, SA&MG Survey, flowed 109,000,000 cubic feet of gas and 545 barrels of distillate per day from perforations at 5,324-82 feet to open Tonkawa sand production in the North Hansford field. Five pay zones now are producing in this north central portion of the country—two of them established this year—and operators are fast linking up scattered new producing areas into one extensive multi-pay reservoir.

Last year's Toronto lime discoveries in the Hugoton field were succeeded this year by a pair of deep tests 30 miles apart, which opened first Morrow production in the main field area of Oklahoma and Kansas. Shut in for pipe line connection in Seward County, Kansas, is the Panhandle Eastern Pipe Line Co. No. 2-20 Shuck in NE SW of Sec. 20-33S-34W, 2½ miles north of Pleasant Valley. This well flowed 5,000,000 cubic feet of gas per day on final company gauge of perforations at 5,987-6,008 feet. Southwest, in Texas County, Okla., the Republic Natural Gas Co. No. 2 Burdge in SW NE of Sec. 20-6N-16ECM, eight miles northwest of Hooker, was completed on flow of 21 million cubic feet of gas per day, plus 6.5 barrels of distillate per million, from perforations at 6,484-6,500 feet.

Several other scattered discoveries round out the picture of important activity up to the midyear point. In Texas, Dallam County gained its third Cisco field when the Shamrock Oil & Gas Corp. No. 1 Skaer flowed 4,280,000 cubic feet of gas per day from perforations at 3,460-92 feet. It is five miles southwest of Cisco production in the Kerrick field. Ochiltree County has an important Morrow discovery, the R. H. Fulton No. 1-54 Share, waiting on potential nine miles southeast of Morrow production in the Camrick field. Across the state line in Texas County, Okla., Phillips Petroleum Company's No. 1 DeLier has promised a new Morrow gas strike nine miles southwest of Morrow pay in the Northwest Eva field. Further northwest, the Superior Oil Co. No. 44-6 Statford, in Baca County, Colo., is to test Marmaton section which flowed gas on drillstem test at a location five miles southwest of the Interstate field and eight miles northwest of the Keyes field. And in Clark County, Kan., the Shamrock No. 1 Stephens "H" this year established a new Morrow producing area 10 miles north of the Harpers Ranch field on potential gauge of 14 million cubic feet of gas per day from perforations at 5,189-5,207 feet.

Overlooked to a certain extent in all the publicity given recent Panhandle discoveries is the fact that production here is not by any means new, though the region might now be classed as a new producing province. Certainly there is a big difference between the old and new producing areas. Panhandle operators now are faced with exploration problems similar to those of other areas—finding and defining reserves in limited fields. Until the end of the second World War, this offered little attraction to operators who had more than they could handle in one giant reservoir.

Stretching for more than 275 miles across the Texas and Oklahoma Panhandle into west-central Kansas, the combined Panhandle-Hugoton field completely dominated drilling for a period of 30 years. Panhandle

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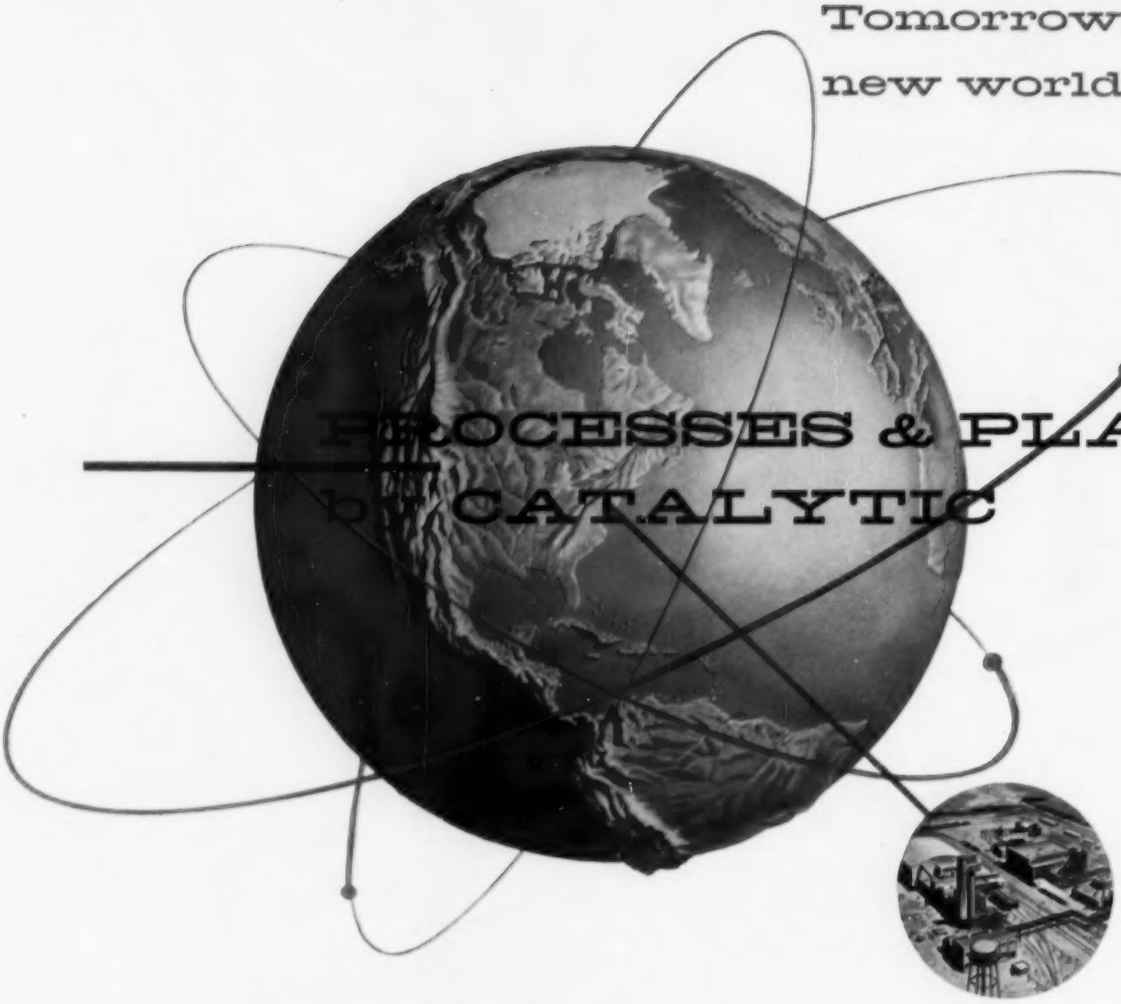

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PANHANDLE

operators were required, almost forced, to devote their capital and energy toward developing the tremendous oil and gas reserves so easily accessible in the relatively shallow Permian formations. Potter County, in what is now the West Panhandle gas field, was the site for the first Panhandle discovery, the Amarillo Oil Co. No. 1 Masterson, completed in December 1918, flowing 10 million cubic feet of gas per day. Kansas saw its first production from Hugoton pay in December 1919, on completion of the Traders Oil Co. No. 1 Boles in Seward County. The Oklahoma Panhandle drew its first Hugoton completion in 1922 at the Home Oil Co. No. 1 Allison in Texas County.

However, there was little market for gas in this then remote territory, other than for local use, and it was not until the discovery of oil during 1921 in Carson County, Texas, that Panhandle activity showed any spirit. The following four years saw oil production established in Wheeler, Gray and Hutchinson Counties, but the year 1925 closed with an average daily production of less than 5,000 barrels for the entire region.

January 1926 marked an explosive change in the oil history of the Panhandle. The Dixon Creek Oil Co. No. 1 Smith Ranch blew in for 10,000 barrels of oil per day to open the Borger field, bringing in a horde of adventurous oil men who stretched the Panhandle field across the top of Texas. Production jumped from approximately 1,200,000 barrels in 1925 to 40,253,000 barrels in 1927, and would have been higher had there been pipe line outlets.

The stock market crash and the flood of oil from the East Texas field, combined with a lack of outlets, reduced Panhandle operations to a state of near-chaos in the 1930's. Unwanted oil was being stored in open earthen tanks, and gas at the rate of more than a billion cubic feet per day was being flared. It was not until 1937 that the field settled down to orderly development under sound conservation practices, and not until the 1940's, when the demand for natural gas stimulated Hugoton field activity, was the field generally defined.

The postwar years brought new pipe lines and a doubling and tripling of the natural gas market, and by 1950 the continuous development in the Hugoton-Panhandle area had brought the field boundaries almost to their present outlines. It was at this point, after approximately 650,000,000 barrels of oil and 20 trillion cubic feet of gas had been taken from the combined reservoirs, that the stage was set for a new oil frontier.

The year 1951 saw deep zone exploration start in earnest in the Basin area. Prior to that time only 27 pre-Permian producing areas had been tapped in the entire 50,000-square-mile region, more than half of these discovered after 1946. Little development had taken place even in the most important of these fields—the Keyes field, for instance, discovered in 1943, had comparatively little activity until 1953-54.

In 1951 there were 14 fields discovered outside the Hugoton field limits, the most important of these being the Greenwood field, now at its peak of development. In 1952 there were 16 fields opened, the Quinduno field of Roberts County being by far the most important. Eighteen fields were established in 1953, the Northwest Eva field of Texas County, Okla., and the Harpers Ranch field of Clark County, Kan., classed as the most important.

But it was 1954 which drew national attention to this province and which brought into focus the discoveries of previous years. There were 61 discoveries and extensions drilled in 1954, as compared with 110 exploratory failures—a discovery ratio of nearly 35 percent. The banner year marked the beginning of current activity in Hansford and Beaver Counties, as well as in the Camrick area of Texas County. First production was established in the Dalhart Basin, and the first Arbuckle discovery was completed in western Kansas. A total of 36 new and separate fields were discovered, pay horizons ranging from Permian through Ordovician.

This activity has continued unabated into 1955—in fact the pace has quickened since the year end. Last year's discoveries have given operators more confidence in their region, as manifested by the sharp increase in rank wildcat tests. At the midyear point the score stands at 42 discoveries and extensions completed or shut in for potential as against 51 dry holes, a ratio of 45 percent.

At the present time there are two exploration trends being worked in the Panhandle area, one on each side of the Hugoton field. More prominent of the two is the one on the east side of the field, which starts in north central Hutchinson County, Texas, extends north-northeast into Texas County, Okla., then swings northeast to join the fields located along the Central Kansas Uplift. This trend has been very rewarding to exploratory drilling, for it has produced from numerous formations in three of the four major geologic systems in the province. Activity in Hansford County, Beaver County and Kiowa County is spotted along the axis of this trend, but discoveries are being completed along distances both north and south of the main trend area.

On the west side of the Hugoton field is a less pronounced trend starting in southern Hartley County, Texas, and extending northeast into Kearney County, Kan. Production in this trend has been confined to Pennsylvanian formations to date, in the Channing, Rehm, Stratford, Kerrick, Keyes, Greenwood, Richfield, Sparks, Helfrich and Patterson fields.

Actually, neither trend is based on a set geologic condition, but rather on production resulting from more intensive exploration in an area which has proved productive in earlier exploration. Future activity more than likely will dissipate these trends as production becomes more widespread over the entire province. And as is true of all oil areas, this future production will be found on the basis of knowledge gained from today's operations. Oil men have learned a great deal about the Panhandle's complexities in the past few years, and this knowledge now is beginning to show excellent results.

A specific example is the increasing number of discoveries from Permian and upper Pennsylvanian formations. In many instances, oil and gas shows from the upper portion of the hole are difficult to detect in the Panhandle. Light-colored oils leaving little stain, samples exhibiting faint if any gas odor, and poor electric surveys caused by contamination of drilling fluid from overlaying salt beds—all combined to discourage drillstem testing in many of the older wells drilled here, allowing many prospective pay zones to escape observation.

Present-day geologists are using every testing device practicable to check the rock strata as the bit progresses. Careful microscopic and fluorescent examination of cuttings, mud analysis, cores, drillstem tests, and multi-purpose electric logging are being employed on shallow as well as deep tests in the Basin-Embayment province. Surprisingly, this has opened new pays in a number of established fields.

Modern completion techniques also have given the Panhandle new discoveries which ten years ago would have been dry holes. Selective perforating and fracturing, in particular, are vital to the future development of this region, where thin tight sands, shale breaks, and water-bearing limes and granite washes require expert completion methods.

In different words, it might be said that today's activity is a happy merger of economics and technology. Only since 1950 has the Panhandle been economically ready for an intensive exploratory play, and only since that year have most of the modern exploration and completion processes been generally accepted throughout the province. The result is a new boom in the Panhandle.

Bolivia

(*Continued from page 61*)

upward to 40 percent on 901 b/d or more. This is payable on a per well basis, which would effect a substantial saving if production is obtained. Royalty on gas is 33 1/3 percent, payable in kind at the well. Domestic consumption of Bolivia must be satisfied before export of production may take place. During 1953 domestic consumption was 2,541 b/d, probably near 3,000 b/d during 1954, and the amount of such consumption must be sold to Y.P.F.B. at U.S. Gulf Coast prices for equivalent crude, less 15 percent. An additional amount up to 10,000 b/d must be sold to Y.P.F.B. at world market prices for sale to Argentina, these sales to be accomplished through use of the Camiri-Yacuiba pipe line mentioned earlier. During August 1955 sales reportedly totaled 2,833 b/d.

The contract exempts McCarthy from income tax for a period of five years after beginning exports. Exemption is also received from import duties on materials and supplies, presumably on a permanent basis. Mr. McCarthy posted a bond of $100,000 with Y.P.F.B., returnable when drilling equipment was shipped in, and met drilling obligations by installing two rotary rigs on the concession area. One is capable of drilling wells to 6,000 feet depth at Los Monos. The other is capable of wells to 13,000 feet depth on the Agua Salada structure.

An unusual feature of the contract is its clause providing that in the event of expropriation or confiscation, the Y.P.F.B. will pay the value of the investment plus a 15 per cent indemnity.

The principal contract areas of interest are the Agua Salada and Los Monos anticlines, both of which were mapped by Standard Oil Co. (N.J.) prior to 1937. The Los Monos structure is a long anticline trending northwest and southeast. It is tightly folded and overthrust from the west which, the contract parties believe, makes possible production from both above and below the thrust fault. Beds of Devonian age are exposed on the surface and beds of Devonian age produce oil in nearby fields. Oil and gas seepages are common.

The Agua Salada structure, which lies to the southeast of Los Monos, is a long anticline trending northeast and southwest, with a number of individual closures along its axis. It is also over-thrust from the west but not quite so tightly folded. Agua Salada is the Bolivian extension of the Madrejones structure and extends on into Argentina where the Campo Duran field produces from the Tupambi sandstone of Carboniferous age. As at Los Monos, numerous oil and gas seepages are observed.

The country to the east of Agua Salada is the flat Gran Chaco region. No outcrops can be observed in the Chaco because they are covered with Chaco Continental deposits, although seismic work may reveal structures similar to Agua Salada although more gently folded and less faulted since they are farther east.

Three Los Monos wells have been drilled and one is drilling on the same anticline. The first was spudded March 7, 1954 and completed at 3,447 feet on April 26, 1954. Good gas shows were obtained at 3,353 to 3,398 feet with production capacity of over 47 mmcf per day. Good oil shows were reported at 2,061-2,071, 2,342-2,360, 2,970-2,973, 3,003-3,014, 3,101-3,103, and 3,294-3,314 feet. The well is shut in for lack of gas transportation facilities.

Los Monos No. 2 was spudded in late May 1954 on the previously un-drilled west flank of the Los Monos anticline and dome and completed September 17, 1954. Electric log and ditch samples analysis and testing showed oil and gas bearing beds in sand members of the Los Monos formation in the intervals of "D" sand at 3,730 to 3,775 feet; "C" sand at 3,505 to 3,590 feet; "B" sand at 3,140 to 3,260 feet. Other shows were recorded but did not have sufficient development for testing. The lower "C" sands tested about three million cubic feet of wet gas per day through a ¼-inch choke and was estimated at 47.5 mmcf/d of gas daily on open flow. The upper sand member is said to be also gas bearing but was not tested. The lower "B" sand was tested and produced oil with relatively low wellhead pressure. Perforations were then extended through the upper sand and both completed as one zone.

The "B" upper sand was cored and showed about 25 feet of net sand in the upper member plus about 30 feet of net sand in the lower member, making the assumed recovery factor about 193 barrels per acre foot by natural or gas expansion recovery mechanics for this sand, according to the syndicate. The operators estimate that the per acre foot factor could be increased to 394 barrels through secondary recovery by water flood. The "C" sand is a highly prolific gas bearing sand which is apparently rich in liquid or natural gasoline fractions. In lower structural position the sand may contain a liquid phase.

The well has a free-flowing capacity of 200 b/d at present without being fractured, acidized or otherwise treated, which the operators estimate would bring its production to 500 b/d.

Los Monos No. 3 was spudded September 27, 1954 and completed Nov. 6, 1954. It was reported to have essentially the same characteristics as Well No. 2, with free flow capacity of approximately 200 b/d, according to the syndicate. Final completion ran into a fishing job for tools which will require special equipment before the well can be completed.

Los Monos No. 4 is said to be essentially a stepout from Los Monos Nos. 2 and 3. It is placed higher on the Los Monos structure and has its objective at about 3,775 feet. A 45-foot pay section has already been encountered, according to the syndicate, at 1,758-1,810 feet. As of September 2, 1955 the well was awaiting the arrival of logging equipment. It is considered by the operators to be a producer similar to the previous wells.

Petroleum development began in Bolivia with the discovery by Standard Oil Co. (N.J.) of oil on the former Richmond Levering Co. concession. By 1937 Standard had drilled 28 wells and spent approximately $17 million on exploration and development.

During the early 1930's the Gran Chaco war with Paraguay, the most disastrous event in modern Bolivian history, broke out. It lasted until June 1935 and resulted in three-fourths of the disputed territory being given to Paraguay. Standard was not required to refine or develop extensive marketing facilities under its concession and, in view of the difficulties and lack of markets, had not done so. This, with an allegation that Standard had refused to supply military needs and was exporting crude to Argentina by secret pipe line, served as the basis for expropriation of all Standard's holdings on March 15, 1937, despite a report by an Argentine government commission that the charge was unfounded. Y.P.F.B. was created in December 1936 and given exclusive rights to petroleum exploration and development by the Decree-Law of Nov. 5, 1937. Previous concessions were excepted but the only concession was Standard's, which had been expropriated.

In April 1942 Bolivia paid Standard $1.5 million as a settlement which represented a loss to Standard of about $15.5 million.

A similar experience befell the tin companies of Bolivia. Agitation began before World War II and culminated in their expropriation under the present President of Bolivia, Victor Paz Estenssoro, on Oct. 31, 1952. Repayment is to be effected out of earnings of the companies.

The failure of expected production to materialize under Y.P.F.B. has led, in the past, to several considerations of more liberal legislation to attract foreign operators back to Bolivia. In 1947 Y.P.F.B. signed an ad referendum contract with Superior Oil Co., covering 11 million areas in southeastern Bolivia. The contract was defeated in Congress, however, and lapsed. Several other attempts were reported, among them the liberalization of several areas mentioned previously which resulted in the McCarthy contract. The discovery of increased production at increased depth in Camiri, also mentioned, seemed to close the door until a few months ago.

During the summer of 1955 several proposals have been brought forward for a more liberal petroleum law, and reportedly the President, Paz Estenssoro, is in favor of a law which would stimulate development by foreign companies. Partly this attitude is inspired by the desire to get back an area which, under a protocol signed with Brazil in 1938, gives that country a concession of 84 million acres for oil development. It was given in exchange for Brazil's financing a railway between Corumba and Santa Cruz at a reported cost of about $55 million. Admission of foreign companies would enable Brazil to pay off this debt and retrieve the area.

BP PROBES DEEP AND FAR

FROM A PALACE on the shores of the Persian Gulf Shaikh Shakhbut ibn Sultan's rule extends over the territories of Abu Dhabi, both the land and the waters overlying its continental shelf. Beneath these waters —perhaps—lies oil.

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REVIEW OF U.S. PATENTS ON POLYMERIZATION

By Felix Heinemann and Heinz Heinemann

The number of newly issuing U.S. patents concerned with various phases of polymerization is larger than that of any other petrochemical subject. The field was last reviewed in WORLD PETROLEUM of September 1954. Several hundred patents have issued during the past year (July 1954-July 1955) and the current review can therefore only present a selection of what the authors consider the most significant patents, typical of trends and thoughts in the field.

Homopolymers

Ethylene polymerization continues to be a very active subject. Patent 2,699,457 to K. Ziegler and H. G. Gellert describes a modification of the Ziegler process developed in Germany and reportedly under commercialization in the U.S. Ethylene is heated to 60-250°C in the presence of a polymerization activator comprising beryllium, aluminum, gallium or indium which has the valence linkages individually bound to hydrogen, monovalent saturated aliphatic hydrocarbon radicals or monovalent aromatic hydrocarbon radicals. Pressures of 10 to 2,000 atm. can be used. The amount of catalyst employed should not exceed 1/20 of the molar amount of ethylene present. Polymers ranging from butylene to wax can be produced.

Standard Oil Co. of Indiana is the assignee of a large group of ethylene polymerization patents. According to A. Zietz (2,692,257), the polymerization is carried out at 75-325°C with an activated catalyst comprising at least 1 percent each of a hexavalent molybdenum oxide compound and an activated absorptive gamma alumina. The catalyst is activated prior to use by treatment with a reducing gas of at least 300°C. A modification of this process is contained in 2,702,288 (H. Hocksema and E. F. Peters). The molybdenum oxide on alumina, titania or zirconia catalyst is reduced at 300°C and then activated by contact with a hydrocarbon, decomposable at 450-700°C at this temperature and in the absence of hydrogen. E. F. Peters and B. L. Evering (2,692,261) produce polymers of more than 300 molecular weight by contacting ethylene at 10-300°C and at least 50 psig. with a nickel or cobalt catalyst on an activated carbon support in the presence of a liquid hydrocarbon medium consisting of alkanes with more than 3C atoms/mole or of cycloalkanes. Solid polymers from ethylene are obtained by E. Field and M. Feller (2,691,647) at 75-325°C over an alkali metal and an oxide of group 6a of the periodic table. Patent 2,710,854 (H. S. Seelig) describes the polymerization at 100-350°C over a carbide of calcium, strontium or barium and an oxide of chomium, molybdenum or tungsten. W. J. Cerveny, D. E. Burney and G. H. Weiseman (2,685,577) use a diperoxy dicarbonate ester catalyst for the production of solid polyethylene from ethylene at 55-100°C and 4,000-20,000 psig. in an aqueous solution of methanol or tertiary butanol.

Boron hydride or diborane are the catalysts proposed for ethylene polymerization in Borden Co.'s 2,685,575 (R. G. Heiligmann and F. Bennington). Operating conditions are 55°C and 1,200-4,500 psig. Olin-Mathieson Chem. Corp's 2,713,044 (R. E. McArthur and J. S. Logan) polymerizes ethylene with small amounts of an ozonide of an ethylenically unsaturated compound.

Another Ziegler and Gellert polymerization patent (2,695,327) is not limited to ethylene. Unsaturated straight chain hydrocarbons containing more than 2C atoms/mole are heated to 80-250°C in the presence of a dimerization catalyst of the formula $Me(R)_n$, where Me is beryllium, aluminum, gallium or indium, R is hydrogen, a monovalent saturated aliphatic or a monovalent aromatic hydrocarbon radical and $_n$ is the valence of Me.

A very considerable number of patents dealing with polymerization of C_3-C_5 hydrocarbons has been obtained by Standard Oil Development Co. Some of these are discussed in this paragraph. A phosphoric acid polymerization catalyst is employed by S. B. Lippincott and H. L. Yowell (2,695,326) to polymerize at 350-500°F a mixture of propene and butenes, containing n-butene and not more than ½ mole i-butene per mole of n-butene. A conversion yield of 85-95 percent is obtained. S. B. Sweetser and D. D. McLaren (2,697,733) utilize a co-suspension of finely divided catalyst comprising phosphoric acid on a solid non-carbonaceous carrier and finely divided absorbent carbon impregnated with phosphoric acid to polymerize normally gaseous olefine in a fluidized system. Decomposable hydrated phosphates of cobalt, copper or nickel are proposed as catalysts in 2,686,210 (I. Kirschenbaum and C. W. Skarstrom). K. K. Kearby in 2,682,565 countercurrently contacts olefins to be polymerized and liquid phosphoric acid, passed as a continuous film downward over a packing material. Acid withdrawn at the bottom of the reactor is recycled. W. F. Rollman (2,689,267) describes a process for polymerizing olefins over a bed of granular catalyst at 350-600°F and 500-1500 psig. A combination catalytic cracking and polymerization process is disclosed by K. K. Kearby, I. Kirschenbaum and J. O. Smith (2,678,904). Silica-alumina catalyst is used for fluid type catalytic cracking and catalyst from the cracking zone is then contacted at lower temperature and a pressure below 100 psig. with gaseous olefins formed during cracking. L. Dauber and R. H. Mueller (2,708,682) show a method for polymerizing olefins in a plurality of reaction zones, fluidly connected in series (see the accompanying sketch).

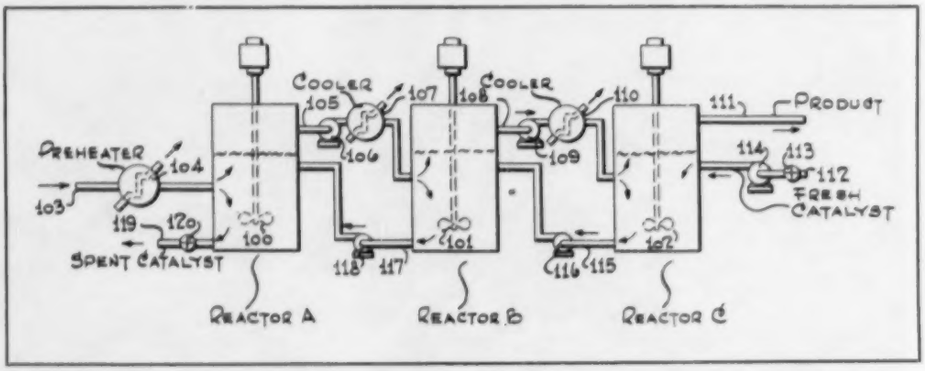


Diagram of Patent 2,708,682, Polymerization of Olefins with Slurried Catalyst, to L. Dauber and R. H. Mueller.

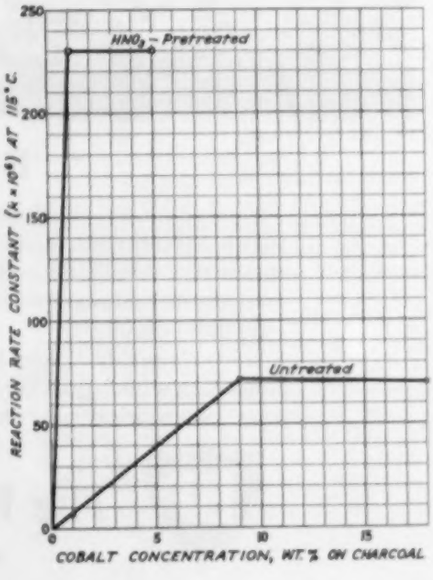
Production of heavier homopolymers is disclosed in another group of Standard Oil Development Co. patents. F. R. Russell (2,688,646) employs a two zone process. In the first zone a slurry of finely divided solid catalyst in olefins is agitated while in the second zone further polymerization of the effluent of the first zone takes place. The same type of catalyst is used, but without much agitation. A. R. Garabrant. H. G. Goering and H. G. Schneider (2,698,320) polymerize isobutylene by agitation with 0.5-1 percent of finely divided aluminum chloride having a particle size of less than 0.2 mm at —67 to 32°F and at an agitation speed of 5,000 rpm. Zirconium chloride complexed with an organic ether is the catalyst J. L. Ernst and R. M. Thomas (2,682,-531) propose for the polymerization of isobutylene at —20 to —165°C. W. R. Lewis, W. L. Bird and L. B. Page (2,688,004) produce an iso-butylene polymer in an aqueous slurry, the pH of which is controlled below 7.

Phillips Petroleum Co. patent 2,694,002 (G. E. Hays) describes a method of polymerizing normally gaseous olefins to gasoline boiling range hydrocarbons. Silica-alumina catalyst is used at 260-500°F and 750-2,000 psig. to effect 40-60 percent polymerization. The effluent is passed over solid phosphoric acid at 325-385°F and 750-2,000 psig. to carry the conversion to 75-95 percent. R. M. Deanesley (2,684,325 to Universal Oil Products Co.) discusses a combination reforming, cracking and polymerization process.

Standard Oil Co. of Indiana has secured a number of patents in this field. Normally gaseous unbranched mono-olefins are polymerized according to E. F. Peters (2,692,295), over cobalt supported on activated charcoal which has been treated with nitric acid to remove impurities. In another patent (2,700,663) Peters produces solid polymers from ethylene and propylene in the presence of a liquid hydrocarbon reaction medium at elevated temperature and pressure over a reduced molybdenum oxide on alumina, titania or zirconia catalyst, which has been activated with 0.01-5 percent acetylene. J. Minsk (2,681,903) proposes the polymerization of isoolefins with an aluminum chloride-acetone catalyst at 0 to —150°C in the presence of an inert diluent consisting of a cycloparaffin which does not contain any tertiary H atoms. The aluminum chloride to acetone ratio used is 1-1.3. A ketone-aluminum chloride mixture, in which the ketone is acetone or methyl ethyl ketone, is used by H. Shalit and A. P. Lien (2,697,694) to polymerize butylenes at below —25°C.

Relatively few patents have issued on rubbery homopolymers. Du Pont's 2,708,639 (H. C. Miller) discloses an oily homopolymer of butadiene, 1-3 which yields films which are flexible after baking for 18 hours at 130°C and which is produced by polymerization at —20 to +20°C in the presence of boron trifluoride etherate containing from 0.1 to 1.4

Patent 2,692,295 to E. F. Peters, Polymerization of Olefins with Catalyst of Cobalt on Coconut Charcoal Pretreated with Nitric Acid.



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moles of water per mole of complex. According to another du Pont patent (2,683,140; E. G. Howard), ethylenically unsaturated monomers are polymerized in aqueous suspension with vanadous ion and a hydroxylamino compound. C. M. Tucker (2,688,-605 to Phillips Petroleum Co.) describes a synthetic rubber produced by homopolymerization of butadiene and masterbatching of the resulting latex with carbon black prior to coagulation of the polymer. A polymerization catalyst consisting essentially of potassium permanganate and oxalic acid is disclosed in Allied Chemical & Dye Corporation's 2,701,242 (M. Erchak, Jr., K. F. Koch and H. Knutson).

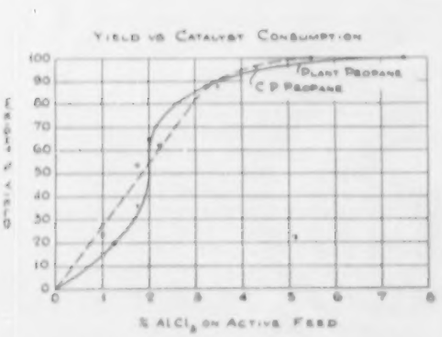
Copolymers

The manifold possibilities of combining various olefins in copolymers offer a fruitful field for research. The small selection of patents presented here can give only an indication of the size of the efforts that has been reported in the patent literature.

G. E. Serniuk and J. D. Garber (2,676,933 to Standard Oil Dev. Co.) produce a resinous polymer from a 60/20/20 mixture of butadiene, isobutylene and toluene. The mixture is diluted with methyl chloride and cooled to 0 to —40°C. Aluminum chloride (100 wt. percent) catalyst is added in solution in ethyl chloride; the $AlCl_3$ concentration in the solution is between 0.1 and 5 percent. A gel-free synthetic rubber latex is disclosed in Phillips Petroleum Company's 2,685,576 (C. F. Fryling and A. E. Follett) and is produced from butadiene-1,3 and styrene, an emulsifying agent and an oxidant-reductant polymerization catalyst in the presence of a C_5-C_8 paraffin or olefin. H. G. Goering and J. P. Rocca (2,683,138 to Standard Oil Dev. Co.) make a tripolymer from 50-75 percent styrene, 25-35 percent iso-butylene and 10-18 percent propylene at —44 to 0°C with a boron trifluoride or aluminum chloride catalyst. Copolymerization of styrene with a vegetable drying oil is proposed in British Resin Products Ltd. patent 2,698,839 (S. E. Bradshaw, and E. M. Evans). A transfer agent consisting of carbon tetrachloride, ethylene dichloride and tetrabromo ethylene is used. W. J. Sparks and D. W. Young (2,676,950 to Standard Oil Dev. Co.) manufacture a tripolymer of a molecular weight of at least 2,000 and an iodine number of 1-20 by copolymerizing at —10°C with a Friedel-Crafts type catalyst a mixture of 64 percent styrene, 3 percent polyolefin of 4 to 10 C atoms/mole, and 33 percent of an alkene of 3-8 C atoms/mole.

A copolymer, suitable as a coating material, is discussed in Pittsburgh Plate Glass Company's 2,689,231 (J. F. McKenna). It is made from 5-30 percent cyclopentadiene, 10-45 percent benzene having an α, β ethylenically unsaturated side chain, and glyceride oils. L. M. Welch, J. F. Nelson and H. L. Wilson (2,671,073 to Standard Oil Dev. Co.) copolymerize iso-butylene and a conjugated multi-olefin of 4-8 C atoms/mole with a Friedel-Crafts catalyst at —40 to 164°C under specific conditions. Welch, in another Standard Oil Div. Co. patent (2,674,586) discloses a vulcanizable copolymer of an iso-olefin with 3-5 C atoms and a cyclic conjugated diolefin of 5-8 C atoms, having both double bonds in the ring. The polymer is oxidized at 90-200°C with air, oxygen or a peroxide until 0.1-5 wt. percent oxygen is combined with the polymer. J. F. McKay (2,698,841 to Standard Oil Dev. Co.) describes the reaction product of an olefin-diolefin resin with a cyclodiolefin. The product was a high softening point. In the same company's 2,689,835 H. L. Wilson and L. W. Anderson discuss polymerization of 75-95 percent methylcyclopentadienes and 25-5 percent cyclopentadienes over a Friedel-Crafts catalyst at —90 to —165°C to produce a rubbery polymer.

According to G. A. Griess (2,683,127 to the Dow Chemical Co.), modified vinyl aromatic resins of improved impact strength and elongation values can be made by mass polymerization of 50-96 pts. of monovinyl aromatic, 2-40 pts. of a monoisopropenyl aromatic and 2-10 pts. of an unsaturated rubbery polymer of an aliphatic conjugated diene. F. T. Wadsworth (2,709,695 to Pan American Refining Corp.) produces thermoplastic resins with an iodine number below 80 by polymerizing unsaturated hydrocarbon mixtures at temperatures above 500°F over a boron trifluoride catalyst.



Patent 2,683,138 to H. G. Goering and J. P. Rocca, Propylene-Isoolefin-Cyclic Olefin Tripolymer.

Polymers with Non-hydrocarbon Components

In order to narrow down the very large subject of non-hydrocarbon polymers, this section is limited to patents which deal with polymerization of substituted hydrocarbons or hydrocarbon-non-hydrocarbon mixtures.

Several M. W. Kellogg Co. patents are concerned with trifluorochloroethylene polymerization. J. S. Rearick (2,684,959) copolymerizes the compound with another halogenated olefin, substituted only with halogen and at least one fluorine atom. Polytrifluorochloroethylene is obtained according to 2,689,241 (A. L. Dittman and H. J. Passino) by polymerizing trifluorochloroethylene in the presence of potassium persulfate as promoter, sodium bisulfite as activator and a water soluble salt of iron as accelerator. In 2,694,701 O. A. Blum, A. L. Dittman and J. M. Wrightson carry out the polymerization of trifluorochloroethylene at 70-200°C for 1 min. to 10 hours in the presence of benzoyl peroxide as promoter and chloroform as chain transfer solvent.

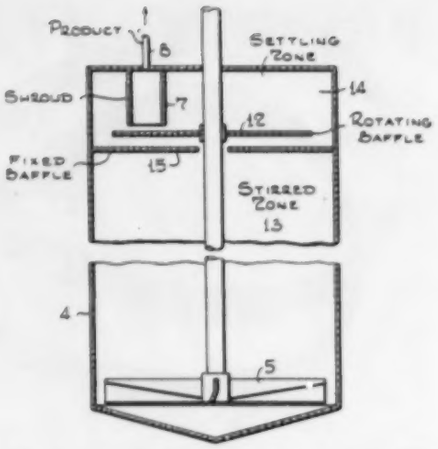
W. W. Crouch and T. F. Crosnoe (2,688,009 to Phillips Petroleum Co.) describe a solid reaction product made from a liquid polymer of a conjugated diene and compound of the formula $CH_2{=}CR^{I}{-}A{-}CR^{II}{=}CH_2$ wherein A is an arylene radical, sulfur or oxygen and each R is hydrogen, methyl or ethyl.

A method of mass polymerizing styrene and vinylhalides is disclosed in Monsanto Chemical Company's 2,713,042 (H. F. Park). The reaction is carried out at 100-400°C and 1-500 atm. pressure in contact with 0.01-5 parts of a polymeric adipoyl peroxide having an average degree of polymerization of more than 6. H. C. H. Kolvoort (2,673,193 to Shell Dev. Co.) describes the coagulation of a stable latex of a vinyl chloride polymer which has a pH of at least 7. A coagulating agent of the group consisting of alcohols containing from 3-12 C atoms/mole and their mixtures with ketones is added.

A melt-spinnable, fiber-forming polymer is the subject of Dow Chemical Company's 2,700,657 (A. T. Look and J. N. McDonald). It consists of a blend of 80-98 percent polystyrene and 20-2 percent of a copolymer of styrene and acrylonitrile.

Polymeric polysulfones are produced according to S. E. Ross and H. D. Noether (2,698,317 to Celanese Corp. of America). An olefinic compound, copolymerizable with sulfur dioxide is mixed with an organic hydroperoxide polymerization initiator and then with an excess of cooled liquid sulfur dioxide, while bubbling an inert gas through the latter. W. M. Kleinbacker (2,696,476 to United Shoe Machinery Corp.) describes a soft, deformable composition convertible by heat to resilient condition. It comprises 75-50 percent of a rubbery hydrocarbon polymer and 25-50 percent of a viscous liquid copolymer, which is formed from 100 parts of coagulated C_4-C_6 diene and 60-140 parts thiophene in the presence of an organic peroxide catalyst.

M. E. Pruitt and J. M. Bagget (2,706,181 to the Dow Chemical Co.) polymerize a lower olefin oxide to a solid polymer. The catalyst employed is a complex condensate of a ferric halide and propylene oxide.



Sketch of patent 2,686,110 to J. A. Carver, Polymerization Reactor

Equipment and polymerization methods

A polymerization reactor (shown in the accompanying sketch) is described in Standard Oil Dev. Company's 2,686,110 (J. A. Carver). A method of preparing a high solid synthetic rubber latex by emulsion polymerization is contained in the same company's 2,676,951 (E. A. McCracken and J. L. Betts). W. F. Rollman (2,689,267 to Standard Oil Dev. Co.) is concerned with an arrangement to polymerize olefins over a granular catalyst.

Olefin polymerization with aluminum chloride-hydrocarbon complex catalysts is the subject of 2,677,001 (N. Fragen to Standard Oil Co. of Indiana). Complex formation of make-up powdered aluminum chloride with the slurrying agent is avoided by introducing dried polymer into the mixing zone in the absence of moist hydrogen chloride. P. L. Shanta (2,694,700) describes an arrangement for a continuous suspension polymerization process. J. D. Robinson (2,698,311 to American Cyanamid Co.) employs tertiary butyl perbenzoate as a polymerization catalyst in a liquid, water insoluble catalyst emulsion.

Plasticizers, Emulsifiers, etc. and Specialty Products

H. S. Bloch (2,671,068 to Universal Oil Products Co.) describes a plasticizer consisting of an unsaturated polycyclic hydrocarbon residue containing conjugated olefin unsaturation. This material is produced by reacting in the presence of liquid hydrogen fluoride at 0-150°C an aliphatic hydrocarbon, recovering a substantially fluorine-free hydrocarbon material boiling above 150°C and reacting it with sulfur. Emulsifying and surface active agents are described in Universal Oil Products Company's 2,677,702 (H. S. Bloch, A. E. Hoffman and H. E. Mammen). An aliphatic mono-olefinic hydrocarbon below C_6 is copolymerized with a C_4-C_6 diene or its halogen substituted homologue. The reaction is carried out at —100 to 0°C with sulfur trioxide. Sulfonation is also effected.

L. M. Welch (2,686,183 to Standard Oil Dev. Co.) plasticizes a rubbery copolymer of i-butylene and conjugated diolefins, by mixing it with 0.05-1 percent of an arylmercapto hydrocarbon in the C_9-C_{16} range at 200—200-350°F. S. J. Hetzel (2,697,087 to Sun Oil Co.) uses a diester of a glycol of 1,5-pentanediol to plasticize a rubber-like butadiene-acrylonitrile copolymer. A synergistic combination of emulsifiers with certain trisubstituted hydroperoxymethanes for emulsion polymerization processes is disclosed in Phillips Petroleum Company's 2,686,-165 (C. F. Fryling and A. E. Follett).

J. E. Troyan and W. G. Chapman (2,684,357 to Phillips Petroleum Co.) discuss emulsifying agents and activators for emulsion polymerization. A tertiary alkyl mercaptan in the C_{10}-C_{16} range is used as emulsifier and an activator solution is employed which consists of ferrous sulfate, sodium pyrophosphate and hydrogen chloride. C. A. Uraneck and S. H. Landes in the same company's 2,694,053 propose trimethylene polyamines as activators. Accord-

(*Continued on page 76*)

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SIE Automatic Title Printer

Southwestern Industrial Electronics Co., Houston, has developed an automatic title printer which photographically prints title and record identification information at the instant seismograph recording begins. This information has, in the past, been hand written on the records at some time subsequent to recording, and confusion over record sequence, proper record identity, and other information has often occurred. The exact shot time, the date, the record serial number, and the compass heading (if desired) are also recorded on the front of the record.

The printer is housed in an aluminum case in which any SIE model PRO or RO recording oscillograph may be installed after slight modifications. New oscillographs may be ordered installed in the printer, thus saving the cost of the standard case and modifications.

The automatic title printer is used in conjunction with the DIE Sequence Timer. The timer automatically starts the oscillograph, blocks off the galvanometer traces to provide the titling space, prints the title block, and, if desired, can be used to fire the seismic charge or provide a shot-signal.

William Keen

William Keen, 63, who retired last July as manager of domestic marketing operations of The Atlantic Refining Co., died August 26 at Bryn Mawr, Pa. For 35 years, until 1948, he held various posts in Atlantic's New England marketing region, and then was promoted to manager of domestic marketing operations and transferred to the company's headquarters in Philadelphia.

Erratum

In a caption on page 89 of the Annual Refinery issue a simplified flow diagram of the hydrodesulfurizer at Shell's Stanlow refinery was erroneously referred to as "British Petroleum's Stanlow refinery." Elsewhere in the article the plant was properly attributed to Shell.

Research Appointments

Four new research appointments have been made by Universal Oil Products Co., Chicago. Dr. Vladimir Haensel has been made director of refining research and Dr. Herman S. Bloch deputy director. Dr. J. A. Chenicek was appointed director of chemical research and Dr. M. J. Murray director of physics research.

New SEG Officers

R. C. Dunlap, Jr., Dallas, vice president of Geophysical Service, Inc., was elected president of the Society of Exploration Geophysicists in the recent mail ballot. Dave P. Carlton, Houston, chief geophysicist of Humble Oil & Refining Co., will be vice president. George A. Grimm, Midland, Texas, district geophysicist for Tide-Water Associated Oil Co., is the new secretary-treasurer. Dr. Norman Ricker, Tulsa, senior research physicist for The Carter Oil Co., was elected editor of the society for a two-year term. The new member of the SEG executive committee will take office at the close of the society's 25th annual meeting, October 6, 1955 in Denver, Colorado.

Hydroformer Reactor Explodes

An explosion in the reactor of its new 25,000 b/d fluid hydroformer caused major damage at the Whiting, Ind., refinery of Standard Oil Co. (Ind.) on August 27. The explosion and subsequent fire caused the loss of about 70 storage tanks containing a million barrels of crude and products, damage to a treating plant and two pump houses.

No employee was killed by the explosion. Walter Rhea, an assistant general foreman, died of a heart attack when he reached the fire. One child outside the refinery yard was killed by flying metal.

Loss was stated by the company at "more than $10 million." The company carried disaster insurance on losses over $1 million.

Explosion in the reactor occurred early in the morning during the circulation of gases in starting up the unit after a routine shut-down. A committee of experts has been appointed by the company to determine the cause.

Standard's hydroformer employed the orthoflow principle with the regenerator above the reactor. The reactor itself was 130 feet tall and 24 feet in diameter with a wall thickness of 2½ inches. Weight was 600 tons. Examination proved that breaks did not follow weld lines.

Standard found it necessary to reduce its purchases of crude in the Mid-Continent temporarily after the fire. Runs at other Standard refineries, particularly at Wood River, Ill., were increased. Neighboring refineries assisted Standard in the emergency by providing necessary product shipments. Plant repairs are being expedited and most of the refinery was in operation by mid-September.

The Whiting refinery had maintained a fine safety record prior to the present disaster, having won many awards.

Dr. Vladimir Haensel *Dr. H. S. Bloch* *Dr. J. A. Chenicek* *Dr. M. J. Murray*

Patents

(Continued from page 74)

ing to C. A. Uraneck and R. J. Sonnenfield (2,697,700 to Phillips Petroleum Co.) low temperature emulsion polymerizations can be carried out in polyamine systems containing heavy metal complex activators. Iron, cobalt, vanadium, manganese and copper are suitable metals.

J. R. Little (2,710,291 to United States Rubber Co.) cures an elastomeric polyisobutylene by incorporation of 1 percent sulfur and 2-7 percent of tertiary butylperoxide, followed by heat treating at 145°C.

Linear interpolymers of monovinyl aromatic compounds and a natural or synthetic rubber are described in Dow Chemical Company's 2,694,692 (J. L. Amos, J. L. McCurdy and O. R. McIntire). R. V. Jones (2,693,461 to Phillips Petroleum Co.) produces a hydrogenated elastomer by subjecting a rubbery polymer of a conjugated diene to hot milling and hydrogenating the milled product, which is then capable of being extruded to produce a smooth surfaced article. A latex paint is disclosed in Standard Oil Dev. Company's 2,676,930 (J. F. McKay, Jr. and S. F. Williams, Jr.). It comprises 35-60 parts polybutadiene latex, 15-25 parts pigment, 1-3 parts kaolin, 1-3 parts alpha-protein, 0.15-0.25 parts methyl cellulose, 0.01-0.03 parts of a metal drier and enough water to give a paint having a solids content of 35-60 percent.

Spherical bodies of rigid polymer are produced according to F. H. Winslow (2,712,536 to Bell Telephone Laboratories) from a mixture of divinyl benzene and monovinyl aromatic hydrocarbon. The mixture is agitated in at least five times its volume of an aqueous medium, containing a dissolved stabilizing agent comprising polyvinyl alcohol, until polymerization in spheres has occurred. The subject of Standard Oil Dev. Company's 2,689,223 (A. H. Popkin and T. S. Tutwiler) is a viscosity index improver for lube oils. It consists of a copolymer of low molecular weight aliphatic iso-olefin and low molecular weight aliphatic conjugated diolefin.

Colombia

(Continued from page 51)

other fields in Colombia, Cantagallo, El Dificil and Guaquaqi Teran are only a small part of total production.

On the other hand, consumption in Colombia has shown a steep rise during the post war period, from a total of about 13,797 b/d in 1945 to 34,652 b/d in 1954. This is a rise of about 251 percent. Colombia is normally an exporter of crude and an importer of finished products, but consumption increase threatens to cut into oil exports in the near future. Total crude exports rose with increased production in the post war era and leveled with production to 83,299 b/d during 1954, a level slightly below the preceding three years.

The prospect of a stagnate oil economy in Colombia prompted the government to appoint a committee several years back to investigate the situation. The committee's report estimated a substantial decline in oil exports unless production were brought up through intensive exploration. It is partly the result of this committee report, as well as the very explicit economies of the situation, which have led to the present liberalization and encouragement of foreign investment.

Process Refractometer in Production

Consolidated Engineering Corp. has begun production of a process refractometer developed by Phillips Co. It is designed to monitor continuously the refractive index of liquid process streams. Among its uses have been automatic control of liquid stream blending and fractionating tower operation.

The refractometer measures the difference in refractive index between a sealed-in liquid standard and a flowing sample drawn directly from a process line. This measurement is based on the blending effect caused by passing a ray of light from one medium to another of different refractive index. Beam deflection is proportional to refractive index difference and is readily measured by an optical servo system. A telemetering circuit for strip- or circular-chart recording, or direct control, is provided by a potentiometer geared to the servo motor shaft.

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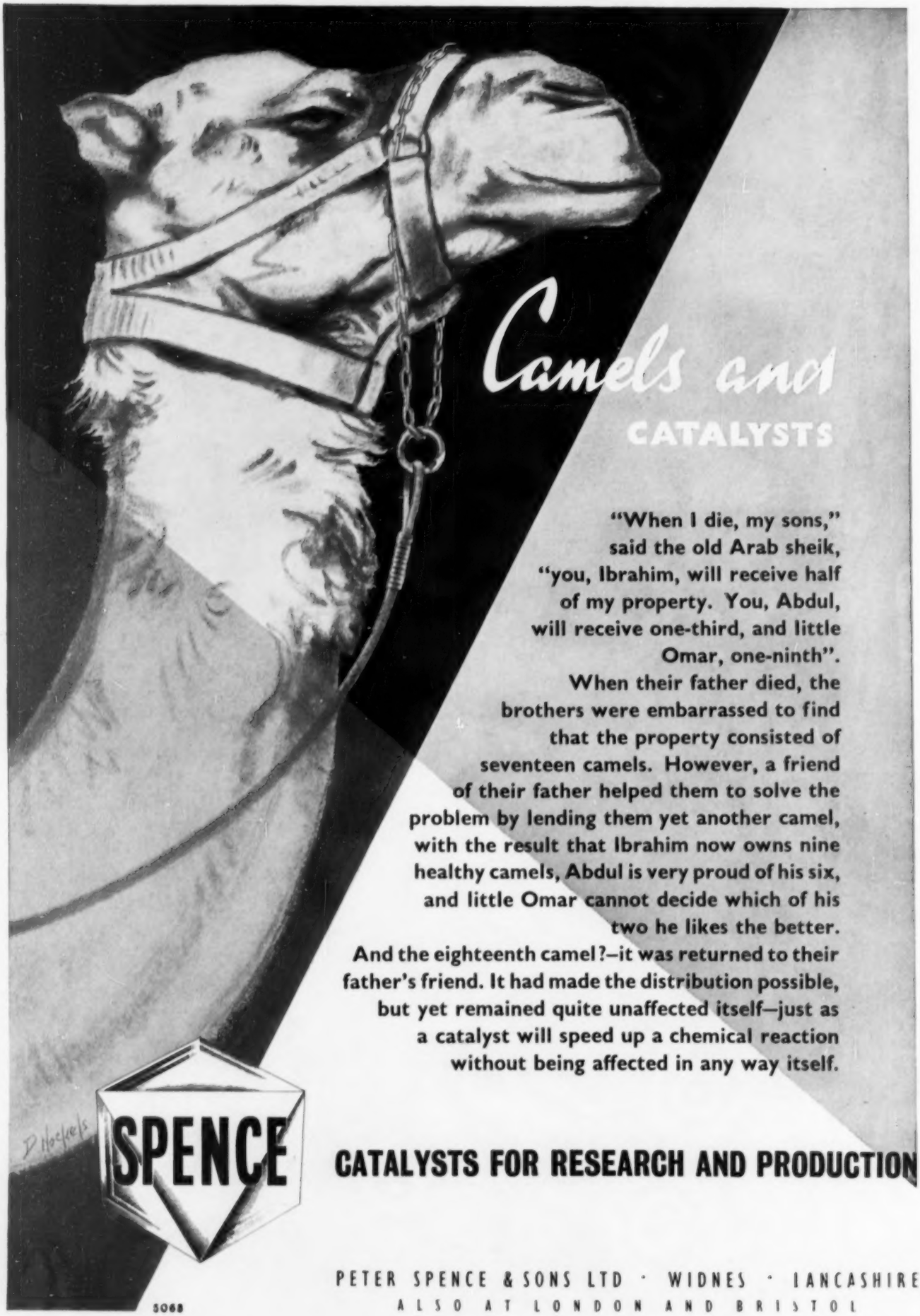
Camels and
CATALYSTS
"When I die, my sons," said the old Arab sheik, "you, Ibrahim, will receive half of my property. You, Abdul, will receive one-third, and little Omar, one-ninth".
When their father died, the brothers were embarrassed to find that the property consisted of seventeen camels. However, a friend of their father helped them to solve the problem by lending them yet another camel, with the result that Ibrahim now owns nine healthy camels, Abdul is very proud of his six, and little Omar cannot decide which of his two he likes the better.
And the eighteenth camel?—it was returned to their father's friend. It had made the distribution possible, but yet remained quite unaffected itself—just as a catalyst will speed up a chemical reaction without being affected in any way itself.
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International News and Notes

British Petroleum Chemicals Expansion

British Petroleum Chemicals, Ltd., which began operations in 1951, has announced plans to spend more than £8 million to expand and diversify its output of petrochemical products at Grangemouth, Scotland. The company is owned jointly by The British Petroleum Co., Ltd. and The Distillers Co., Ltd.

Plans call for the construction of additional cracking and gas separating plants, a synthetic alcohol plant, and a new unit for the extraction of butadiene. In addition, a new unit will be erected at nearby Grange Chemicals, Ltd. (owned by British Petroleum Chemicals and Oronite Chemicals, a subsidiary of Standard Oil Company of California) for the production of detergent alkylate.

The main contracts for the expansion have been placed with two U. S. companies, Stone & Webster Engineering Corp. for the major extensions and Kellogg International Corp. for the butadiene plant. The new units are scheduled to be commissioned at various times between the last quarter of 1955 and the first half of 1957.

New Oil Show in British Borneo

A show of oil has been encountered at 3,500 feet at Jerudong, in the State of Brunei. The location of this well is about 45 miles northeast of the Seria oilfield, which today is one of the largest single fields in the British Commonwealth with an annual production of some five million tons.

Numerous oil and gas seepages have been known in this vicinity since before the first World War, and many unsuccessful shallow wells have been drilled by the Royal Dutch/Shell Group and other companies. A dry hole at Jerudong was drilled in 1940 to 7,976 feet.

The present well will be tested for production at a later date. Meanwhile drilling is being continued. Location was made on the basis of geological and geophysical surveys by British Malayan Petroleum Co. Ltd.

New Test Wells in Papua

Site preparation is being pushed ahead for the drilling of two new test wells in Papua, where British Petroleum along with Australian and American interests are continuing their search for oil. Aramia No. 1 is now drilling at 6,000 feet. One of the new well sites at Kura is about seven miles from the nearest river and a new jungle road for the transport of heavy drilling material had to be built. Owing to Papua's torrential rainfall, 350 inches per year, the building of this road took 17 months. Specially designed landing craft were built for river transport, two of which are being towed out to Papua by tug.

Puerto Rico Ammonia Plant

Construction will begin shortly on a new anhydrous ammonia, sulfuric acid and ammonium sulfate plant at Guanica, Puerto Rico for Gonzales Chemical Industries, Inc., San Juan. The installation was designed and will be built by The Lummus Co. Ammonia capacity will be 42,000 tons/yr. Fuel oil is to be used as raw material.

Aden Refinery Record

The Aden refinery of British Petroleum Co. completed its first year of operation on July 29. Some 3½ million tons of Middle East crude was refined into motor gasoline, kerosine, diesel and fuel oil the first year.

Middle East Crude Oil Production

The following crude oil production figures for the month of July 1955 and for the current year are announced:

	PRODUCTION FOR JULY 1955 LONG TONS	PRODUCTION FOR YEAR 1955 TO JULY LONG TONS
Iraq Petroleum Co. Ltd. (Kirkuk Field)	1,919,097	13,159,168
Basrah Petroleum Co. Ltd. (Zubair & Rumaila Fields)	608,162	3,963,300
Mosul Petroleum Co. Ltd. (Ain Zalah & Butmah Fields)	104,346	741,878
Qatar Petroleum Co. Ltd. (Dukhan Field)	459,595	3,053,915
Kuwait Oil Co. Ltd.	4,824,665	31,948,222
Aramco	3,947,733	27,045,100
(U.S. Barrels)	29,213,224	200,133,739
Iranian Oil Participants Ltd.	1,429,000	8,320,000

Israeli Oil Discovery

A recent discovery has been reported by Lapidot-Israel Petroleum Corp. Ltd., owned by Israeli interests and 31 per cent by American Israel Corp. of New York. The well was reported to be flowing about 1,500 b/d of 30.5° API gravity crude from 4,906 feet. It is a continuation by the company of a previous well drilled by Iraq Petroleum Company's subsidiary in 1947 and plugged at 3,464 feet due to the Arab-Israeli hoslitities.

As originally reported by Ball associates, the well drilled out of Pleistocene beds into Neogene Saqiya marl at 415 feet and out of the Saqiya marl into limestone at 1,047 feet. The bottom of the limestone was tentatively picked at 2,114 feet, but the well continued in calcareous beds to its total depth of 3,464 feet without encountering any Nubian sandstone and probably was in Cenomanian at bottom. Information of later drilling results is not yet available.

Iraq Lube Plant

Foster Wheeler Limited, England, has been awarded a contract by the Iraq Government for the design and construction of a complete lubricating oil refinery at Baghdad, to produce 25,000 tons a year of high-grade lubricants.

The processing units include: vacuum distillation, propane deasphalting, furfural refining, propane waxing, clay percolation and acid treating. The contract also includes a drum and can making plant with filling facilities, cooling tower, tankage and general off-site facilities.

Kwinana Refinery Dedication

The new Kwinana refinery will be officially opened by Field-Marshal Sir William Slim, Governor-General of Australia, on Oct. 25. The refinery began operating on Feb. 1, three months ahead of schedule, and has now processed over one million tons of crude oil.

To meet the increased demand in Australia, a bitumen plant, installed at the request of the West Australian Government, has commenced operation and will produce about 2,000 tons of road material per year.

Oil Production in Great Britain

Production has begun from No. 1 well at Egmanton, Nottinghamshire, where oil was found three months ago by B.P.'s D'Arcy Exploration Co. in the first well drilled in the area.

The second well in this area has been commenced.

New Refinery for Cuba

A new refinery to be financed jointly by Shell and Canadian Eagle Oil Co. Ltd., is to be built near Havana, Cuba. It will have a crude throughput capacity of about 1.25 million tons yearly or about 24,000 b/d. The 130-acre site is on Havana Bay and is now being prepared for construction. This plant is expected to be on stream before November 1956.

Erection of the major facilities, which will consist of crude distillation, Platformer and ancillary units, will begin in the next few weeks.

Completion of this new project will bring the total investment in Cuba of the Shell and Canadian Eagle Oil Co Ltd., groups to over $19 million (including both manufacturing and marketing facilities).

At present a Cuban company jointly owned by the two groups markets its main products and lubricants in the island by importing them through two main ocean terminals, at Havana and Santiago de Cuba. From there supplies go by road to distributors and to a network of up-to-date service stations. In addition, the company is developing a considerable business in chemical and agricultural products. To these activities it will now add also the ownership and operation of the new refinery.

New AIME Local Section Begun in Venezuela

The Venezuela Local Section has begun regular monthly meetings and has elected officers. Chairman is Don M. Chase of Mene Grande Oil Co. C. F. Rust and Jose Paez of Socony Mobil Oil Co. are secretary and first vice-chairman, respectively. M. W. Breedlove of Las Parceles de Anaco is treasurer.

The May meeting was held at Chepa's Icehouse at Anaco and featured a talk by T. A. Pollard of Magnolia Petroleum Co., Dallas on "In-Situ Combustion" research by his company. Chairman Chase announced that several programs a year are to be held featuring as speakers United States businessmen who are in Venezuela and requested that AIME members contact him if they will be in the area and are willing to give a talk.

Management Training Course

Oilmen of seven nations convened in San Francisco for a five-week training course in petroleum products marketing and management techniques practiced by Standard Oil Co. of California. The group of 12 foreign oil executives represent the California Texas Oil Co. Ltd. (Caltex), with which Standard is affiliated in the Philippines, Thailand, India, Australia, Uganda (East Africa) and France.

Colombia Discovery

International Petroleum Co. has reported a new discovery, Lebrija #1, just east of the Magdalena river and only about 66 miles north of Barrancabermeja. The well has about 200 b/d capacity, according to original reports, although original production was about 300 b/d from a ¼-inch choke. The acreage is held by Mobil Oil Co. de Colombia on concession #97. Production is from about 6,842 feet with 27.1° gravity crude.

Esso to Build German Plant

Standard Oil (N. J.) through its subsidiary, German Esso, is contemplating the erection of a three million ton refinery in Germany. The final location of the plant has not yet been decided, but the program is so far advanced that preparations for erection are expected to commence early next year.

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SACCHARIN, AND SUDS

What's in a drop of oil? Petroleum chemistry has found the answer to be without limits.

With petrochemicals, great strides have been made in producing better insecticides and pesticides, thereby enhancing the world's food supply. Petrochemicals brought about the successful synthesis of pharmaceutical compounds, making possible the mass production of life-saving drugs. New building materials . . . synthetic fibers and detergents . . . all of these are the results of continued research in the field of petrochemicals.

To make a great part of these successes possible required from petroleum sources the availability of large quantities of high purity benzene, toluene, and xylenes. These aromatics are now produced in exceptionally high purity and large amounts by the UOP Platforming process and are separated by the Udex process, this latter process developed cooperatively by Dow Chemical Company and Universal Oil Products Company and engineered and licensed by UOP. With these processes a ready supply of aromatics will always be assured.

Unheard of only a short time ago, these developments have become just the beginning for an unlimited future.

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Canadian Notes

New Trans Canada Gas Line Plan

A new plan has been worked out for financing the proposed Trans Canada gas pipe line on an all-Canadian route. Under the new plan a Crown corporation would be organized to build the $110 to $120 million section of the line north of the Great Lakes. The line would be leased to Trans Canada on completion for a ten-year period with an option to purchase.

Cost of the expensive segment of the line which has been in controversy would be borne two-thirds by the federal government and one third by the Ontario provincial government. Formal approval by each still must be obtained.

The new program also is contingent on three actions by the U.S. Federal Power Commission. One approval necessary is the sale of 200 million cubic feet of gas daily for delivery to Tennessee Gas Transmission Co. for Minnesota consumption. Another involves the export of 90 million cubic feet of U. S. gas daily at Niagara until the Canadian line is completed to Ontario after which it is proposed to export 100 million cubic feet of Canadian gas through the Niagara gateway to the United States on an interruptable basis.

Thus far the Federal Power Commission has been most dilatory in approving any across-border gas deals. Another problem is the size of the Canadian line. Present proposal is for a 30-inch line, but some elements urge a 34-inch line to Ontario. Most optimistic estimate places gas deliveries to Ontario through the proposed Crown line in 1958.

New Imperial Divisions

Imperial Oil Ltd. has organized two new producing divisions in western Canada under the general management of Vernon Taylor, Calgary. Divisional headquarters will be at Edmonton and Regina. In addition a district office at Dawson Creek, B.C., in the Peace River area will report directly to the regional manager.

Following are some of the staff changes and transfers resulting from the reorganization.

Walter B. Dingle, former western division engineer, Calgary, becomes manager of the new Edmonton division, and Harold W. Stoneman, producing coordinator, Regina, becomes assistant manager at Edmonton.

Vernon H. Hunter, former management assistant, Calgary, goes to Regina as division manager.

A. L. Laberge becomes production manager, Edmonton, succeeding R. V. Welch, moved to Calgary as assistant regional production manager under V. J. Moroney.

Gas Contract Signed

Trans-Canada Pipe Lines Ltd. has signed a contract to sell 200 mmcf of natural gas daily to Tennessee Gas Transmission Co. at the international boundary near Emerson, Manitoba with an option to sell an additional 200 mmcf/d. An application will be filed by Tennessee with the Federal Power Commission in the near future for necessary permits to import the gas from Canada and to construct the proposed Minnesota-Tennessee pipe line.

Trans-Canada also has entered into a short-term contract to purchase up to 90 mmcf/d of natural gas from Tennessee at Niagara Falls for load building purposes in Ontario.

Chemical Department Formed

Imperial Oil Ltd. has formed a new department to handle the manufacture and sale of petrochemicals. The new group will be known as the chemical products department. The new department will handle sales of alcohols, specialty solvents, bases for detergents and additives for lubricating oils and imported products.

To Build Pipe Plant at Regina

The Regina, Saskatchewan district has been chosen by Hoesch Steel Co. of Dortmund, Germany, as the site of a $3 million plant for the construction of electric resistance weld transmission oil and gas pipe.

The new Regina plant, the first to be constructed by the parent company outside of Germany, will be built on a 160-acre site on the outskirts of Regina. The first step in a gradual expansion program will see the firm producing from 3,000 to 4,000 tons of transmission pipe per month to meet the normal prairie consumption at present of 45,000 tons of gas and oil pipe annually. Pipe will range from 6 inches to 20 inches in size with provision for producing 36 inch pipe when the Trans-Canada Pipeline project gets under way.

Saskatchewan Map

A new large scale map of the Willow Bunch area in Saskatchewan has been produced by the federal government with the cooperation of the Saskatchewan natural resources department's surveys branch. The new map, published in two parts, is on a scale of one to 50,000. It shows lakes, dams, creeks, trails, roads, railroads, power-lines, section lines, treed areas, location of farm houses and main buildings. The maps are contoured representing every 25 foot change in elevation. Copies may be obtained at a cost of 25 cents each from Surveys Branch, Department of Natural Resources, Administration Building, Regina.

Quarterly Map Book

A new quarterly publication of maps showing oil and gas wells in western Canada has been published by Nickle Map Service Ltd. of Calgary, Canada. Included in the 8½ by 14 inch book are 37 maps covering an area of nearly 400,000 square miles from Manitoba across Saskatchewan and Alberta to Northeast British Columbia on a scale of 12 miles to one inch.

Price is $20 per copy or $50 per year.

New Engineering Firm

A new design, engineering and construction organization, the Poole-Pritchard Company Ltd., has been formed with offices in Edmonton, Alberta, Canada. The company's area of operations will be in Western Canada from the Great Lakes to the Pacific. The organization is a combination of the Poole Construction Co. Ltd. of Edmonton and J. F. Pritchard & Co. of Kansas City, Mo.

Saskatchewan Review Published

A pamphlet covering the highlights of Saskatchewan's petroleum and natural gas program for the period 1950-54 was published recently by the statistics division of the Department of Mineral Resources.

"Saskatchewan Petroleum Picture" may be obtained free of charge from Statistics Division, Petroleum and Natural Gas Branch, Department of Mineral Resources, Administration Building, Regina.

Dividend Increased

Interprovincial Pipe Line Co. increased its semi-annual dividend Sept. 1 to 40 cents per share. Previous rate was 30 cents. Net earnings for the first half totaled $2,902,711 or 58 cents per share compared with $3,123,598 last year. Greater provisions were made for depreciation and interest charges resulting from the large 1954 expansion program.

To Build Catalytic Reformer

Imperial Oil Ltd. will build a 13,500 b/d platinum catalyst reformer at its Sarnia refinery, it was announced by R. W. Dunlop, engineering department manager. The unit and allied equipment will cost $5 million. Fluor Corp. of Canada, Ltd., has been awarded the construction contract. Imperial will supply process designs.

William A. Harris, CNE president, cuts the ribbon to open officially the new nine-story Shell Oil Tower at the Canadian National Exhibition. Holding the ribbon is W. M. V. Ash, president of Shell Oil Co. of Canada and on his left is C. W. Chamberlin, Shell's advertising manager. In the immediate background is Frederick G. Gardiner, QC, chairman of the Metropolitan Council.

The brilliantly illuminated new, all-glass nine-story Shell Oil Tower created a striking nighttime scene at the Canadian National Exhibition, the world's largest annual exhibition. It is estimated that about 25,000 visitors per day enjoyed a complete view of the grounds, downtown Toronto and other points of interest from the observation platform at the 90-foot level. Overall height of the $125,000 structure is 120 feet.

Alberta Geologists to Meet

An A.A.P.G. Western Canada regional meeting sponsored by the Alberta Society of Petroleum Geologists in conjunction with the A.S.P.G. 5th Annual Field Conference will be held in Jasper National Park, Alberta. Theme of the meeting will be the Jurassic and Carboniferous systems in Alberta and adjacent areas.

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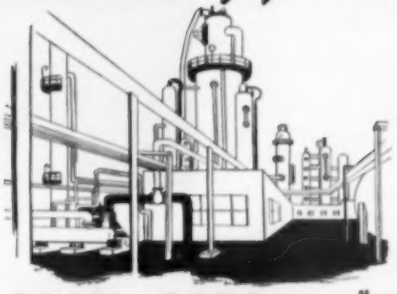

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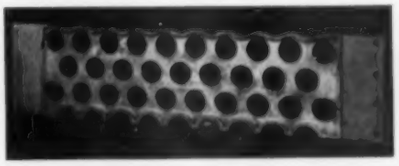

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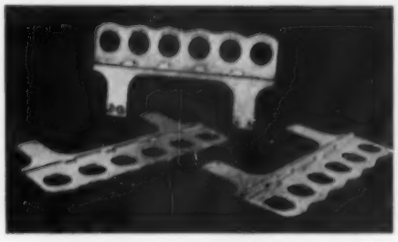

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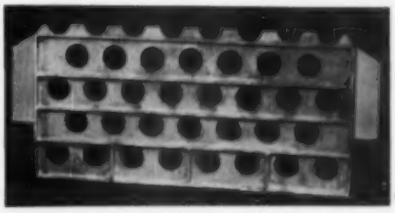

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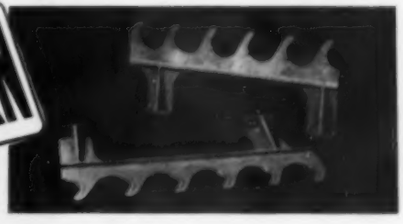

SAMUEL OSBORN & CO., LIMITED
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Photograph by courtesy of The Associated Ethyl Company Limited.

VOKES GENSPRING pipe hangers are used throughout the oil industry

At their Ellesmere Port Works in Cheshire, The Associated Ethyl Company Limited have made use of VOKES GENSPRING Variable Support Pipe Hangers to control movement which could set up very great stresses in the piping. 'Shell' have also incorporated VOKES GENSPRING hangers throughout the Platforming Unit at their Stanlow Refinery in Cheshire.

Photograph by courtesy of 'Shell'.

VOKES GENSPRING Variable Support Hangers are specifically designed for the control of vibration and limited thermal movement of piping, but where piping systems need to be 'floated' to offset the effects of extensive movement, Vokes Genspring Constant Support Hangers should be used. The full range is detailed in the Vokes Genspring catalogues available on request.

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VG-11

British Oil News

By E. Lawson Lomax

Direct taxation of all motor vehicle fuels used in the United Kingdom now totals 2/6d. per Imperial gallon. These taxes are, of course, passed on to the consumer, but their tranamission leaves a large amount, estimated at over £228.75 million during 1954, which must be collected by the oil companies before the oil leaves their depots to the retailers or distributors. The use of this money is therefore an additional form of tax which is in the form of a non-interest bearing floating loan amounting to an average of around £20 million every month. This does not include diesel fuel for road vehicles, or the tax on lubricants, which products total about £48 million during 1954.

The increasing tax burden is well illustrated in the annual report of Shell Transport and Trading Ltd. for 1954 which stated that the Royal Dutch Shell Group paid about £405.8 million in taxes during 1954. This tax burden has risen £144 million over the last five years, compared with an increase in net income for the Group of only £13 million. The proportion for other oil companies would be similar.

The high taxation tends to limit the use of petroleum products in a form of rationing by price and, as a result of the general world increase in costs of crude production, leaves little or no margin for a direct decrease of price to the customers.

British Petroleum Carries Out Motor Spirit Research In The Sahara

In their program for the development of higher quality motor spirits, the scientists of British Petroleum Co. have been carrying out a series of road tests in Algeria in order to find out more about the performance of motor spirit and engine oils under atmospheric temperature driving conditions.

Algeria was chosen as a location because it offered most of the desired requirements for the tests: high ambient temperature, steep roads for hill climbing tests and flat country where cars could be driven at high speeds for long distances.

The main areas for the tests were Bon Saada, 150 miles from Algiers on the edge of the Sahara Desert, Mount Chrea in the Atlas Mountains and Affreville near Algiers.

One of the chief purposes of these tests was to discover more about vapor locking tendencies in hot temperatures. Comparison between hill climbing tests carried out on roads including steep hills and hairpin bends, and full-throttle tests on level roads showed that the tendency for vapor-lock to occur is greater after travelling in low gear up hill than after travelling all-out on a level road.

Further tests are to be carried out in Scandinavia to test the low temperature end of the scale, and to study the effect of cold weather on engine start-

Shell Reclaims Land for Refinery Expansion

Work is now in progress at Shell's Stanlow Oil refinery, Cheshire, to straighten the River Gowy which flows through the site. Its winding course through the refinery of about 3,250 feet is being shortened by 1,000 feet by cutting across the river loops.

Work was begun in March this year and is scheduled for completion early in 1956, at an estimated cost of £150,000. The alteration will enable Shell to recover some 11 acres of land suitable for refinery expansion.

Work involves the removal of some 40,000 cubic yards of alluvial mud, clay, and peat and the provision of some 70,000 cubic yards of extra filling for the old channel, with an additional 32,400 tons of stone filling and 11,500 feet of sheet piling to build the cut-off banks for sealing the old channel.

Council of British Manufacturers of Petroleum Equipment

At the annual meeting of the CBMPE held in July 1955, G. V. Sims, managing director of Le Grand, Sutcliff & Gell Ltd., was elected to the office of chairman in succession to Douglas Wilson (United Steel Companies Ltd.), who had held this office for three years.

In his valedictory address to the members, Mr. Wilson said that the orders placed by the petroleum industry with British manufacturers seem to be running at something like £100 million per year, with every prospect that this figure would not only be maintained, but increased. The figures for the first quarter of 1955 are £32,773,500.

Dealing with the question of maintenance and repair service of refinery equipment, he stressed the fact that the sum currently invested in British refineries at home and abroad must be estimated at some £250 million, and that the annual expenditure on repairs and maintenance in these refineries must be of the order of some £6,250,000, which sum did not include obsolescence or modernization and expansion.

The increasing demands on the services of the Council has necessitated increase in office accommodation, new and larger offices having been taken at 2, Princes Row, Buckingham Palace Road, London, S.W.1.

Douglas Wilson, chairman of the Council of British Manufacturers of Petroleum Equipment, G. V. Sims, managing director of LeGrand, Sutcliff & Gell Ltd. and Mrs. Sims welcomed guests at a party following the annual general meeting of the council July 20.

The Council is taking an active part along with the British Chemical Plant Manufacturers Association in the forthcoming Chemical and Petroleum Engineering Exhibition which will take place at Olympia, London, June 18-28, 1958.

The Council has given active help in the formation of the Federation of European Petroleum Equipment Manufacturers of which Mr. Wilson, the retiring chairman, is president.

Bakelite Ltd. and Union Carbide Ltd.

Bakelite Ltd. announce that they have concluded an agreement with Union Carbide Ltd., U.S.A., by which they will market polyethylene plastics manufactured in the U.K. by Union Carbide Ltd. both at home and abroad.

Union Carbide is constructing a plant at Grangemouth in Scotland to produce polyethylene of the same type and quality as those already made in the United States by Union Carbide and Carbon Corp. This plant is scheduled to come on stream in the summer of 1957.

Bakelite Ltd. is already producing phenolic resins as well as resins of the polyvinyl chloride type, and is well placed to add polyethylene to its already long list of plastic materials.

C. S. Hadfield

Personnel

C. S. Hadfield has been appointed treasurer of The Shell Petroleum and Anglo-Saxon Petroleum Companies and J. G. van den Bosch has been appointed deputy treasurer of these companies.

Shell-Mex & B. P. Ltd. announce that Dr. H. E. M. Priston, chemist, technical department, head office, has been appointed assistant manager (lubricants) technical department, head office.

Manchester Oil Refinery (Holdings) Ltd. announce that Dr. G. Tugendhat has been appointed deputy chairman of the company.

Metropolitan-Vickers Electrical Export Co. Ltd. announce that E. C. Whiteley, who has been the company's special representative since 1949, has now been appointed in addition as manager, Middle East division. Mr. Whiteley joined Metrovick as a school apprentice in 1920 and has been continuously in their service, both at home and overseas, since then.

Harland & Wolff Ltd., shipbuilders, announce the following changes in the board and senior executive positions:

Following the resignation of F. V. Spark, director, chief accountant and secretary, who has been with the company for 45 years, George H. Patten, who has had long service with the company, has been appointed secretary. W. T. Underwood has been promoted from assistant accountant to chief accountant, and Ronald Newell, engineering manager at Belfast, has been appointed to the board.

Sharples Centrifuges Ltd. announce the appointment of G. G. Jackson as a chemical engineer based on the company's Tower House laboratories at Stroud, Gloucestershire. Mr. Jackson was formerly with the Atomic Research Establishment at Harwell.

We regret to announce the death of Alexander Aitkin, chief engineer of the British Tanker Co. Ltd. of the British Petroleum Group, which occurred at Surbiton Hospital August 20. He was 57 and had been chief engineer of the company since September 1952.

E. C. Whiteley

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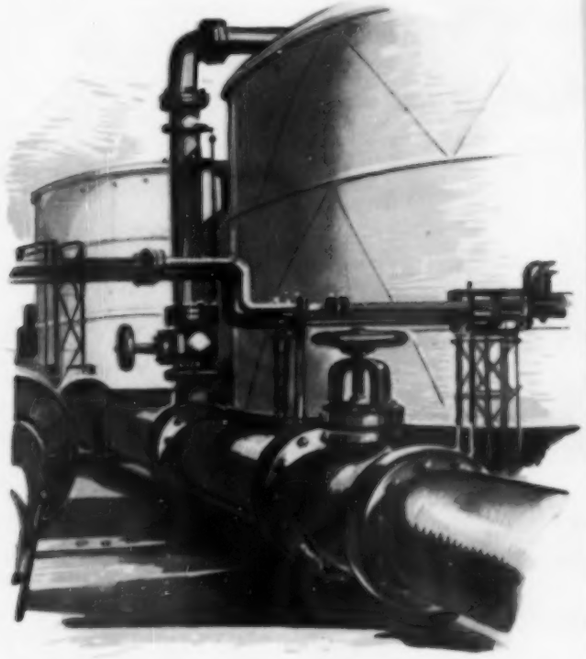
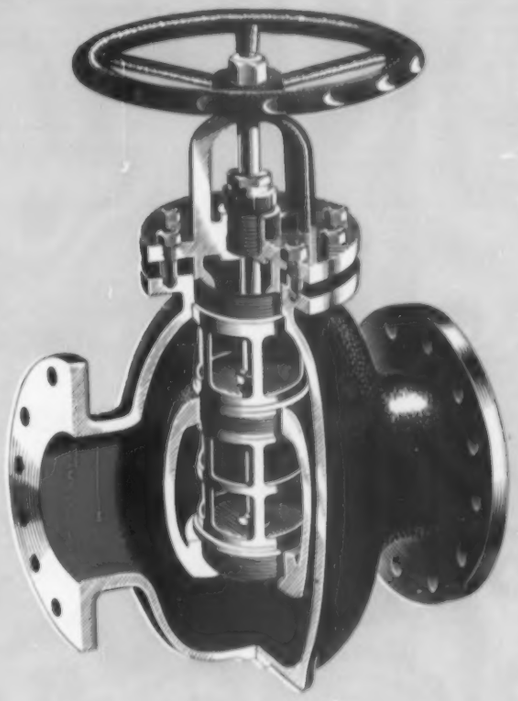
As a result of their outstanding characteristics "Klingerflow" Seatless Piston Valves are most economical in use. They operate on an entirely different principle from the usual type of seating valve. The valve consists basically of a finely ground piston, operated by the valve spindle and handwheel and moving through two or three non-metallic resilient valve rings, capable of resisting oil and most fluids at high temperatures and pressures, and separated by a ported lantern bush.





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The "Segas" Catalytic Oil-Gas Process

The "Segas" process for the manufacture of town gas from petroleum originated in the laboratories of the former South Metropolitan Gas Co. and was further developed by the South Eastern Gas Board, with whom The Power-Gas Corporation Ltd. has entered an agreement as sole licensee for commercial development.

Essentially the process was designed to produce a gas from petroleum, similar in its properties to town gas produced from coal, so that this gas could be delivered into existing distribution mains either alone or mixed with town gas.

So far, heavy fuel oil, 950 secs (Redwood No. 1 viscosity at 100°F); fuel oil, 200 secs (Redwood No. 1 viscosity at 100°F); gas oil; primary flash distillate and butane have been used with success in "Segas" plants.

The primary elements of the plant are the steam preheater, catalyst-bed and air preheater. These, together with a vaporizing chamber, are arranged in two vessels, with each vessel divided into two zones. The upper part of the superheater is the vaporizing chamber and the lower, which is checker-brick filled, is the steam preheater. The catalyst bed is in the upper part of the reactor, and the lower part is a checker-filled air preheater.

The catalyst is a strong, highly refractory one, made from a lime/magnesite mixture and is fully resistant to sulfur, its consumption being about 0.02 lb. per 1,000 cubic feet of gas made.

The process is cyclic and the sequence of valve movements and the duration and make-up can be automatic, mechanical or hydraulic controlled, with interlocking equipment to guard against mechanical failures or against the setting of an unsafe cycle on the operator cams.

The operation of the cycle is as follows: During the make period, steam enters at the base of the steam preheater and passes into the vaporizing chamber where it meets and vaporizes oil sprayed in at the top. The refractory throat in the middle imparts sufficient velocity to the steam to prevent oil droplets from the spray falling on the checker-work below. The mixed steam and oil vapors pass over to the catalyst bed, above which a further oil spray may be located if required, although as a rule all oil is introduced into the vaporizing chamber. The mixed vapors then pass through the catalyst bed and the gas formed here passes downward through the air preheater, giving up a large portion of its sensible heat before going to the wash-box and washer cooler. On completion of the make cycle, a steam purge clears the plant and then an air blast is passed through in the reverse direction. This is heated in the air preheater and burns away any carbon deposited in any portion of the plant during the make period.

The burning of the carbon usually supplies sufficient heat for the process, but an oil burner is installed to augment this if necessary and to control heater requirements generally.

The blow period is followed by a brief steam purge before commencement of the next cycle.

The waste gases, after giving up heat to the checker-work in the steam preheater, pass to a waste heat boiler, which can also be separately fired if required.

The plant is available in five standard sizes ranging from a rate capacity of 250,000 cubic feet to 3,200,000 cubic feet of gas per day.

Power Gas Corporation Ltd. announces that the North Thames Gas Board has placed an order with them for the supply of two 1,500,000 cubic feet per day units, together with a waste heat boiler common to both units and all the necessary ancillary equipment to be installed at the gas company's Uxbridge Works. These plants are scheduled to come into operation by the end of 1956.

Tanker News

Messrs. Hawthorn Leslie (Shipbuilders) Ltd. announce that the 31,000 dwt tanker S.T.S. "Vola," built for Shell Tankers Ltd., was launched from the Hebburn-on-Tyne yard August 18. This is the twenty-seventh vessel built by Hawthorn Leslie for the Royal Dutch/Shell Group, but the first of the supertankers they have built. They are also at present building three other vessels for Shell Tankers, one a sister ship to the "Vola," and two 18,000 dwt general purpose tankers.

The new vessel's principal dimensions are: length overall, 660 feet; breadth molded, 84 feet three inches; and depth molded to upper deck, 46 feet three inches. Cargo pumps were built by Hayward Tyler & Co. Ltd., and the oil fuel and ballast pumps by J. P. Hall & Co. Ltd. The vessel is equipped with steam turbines developing 14,500 shp. and steam boilers by Babcock & Wilcox giving a total of 150,000 pounds of steam per hour at 900 psi and 850°F.

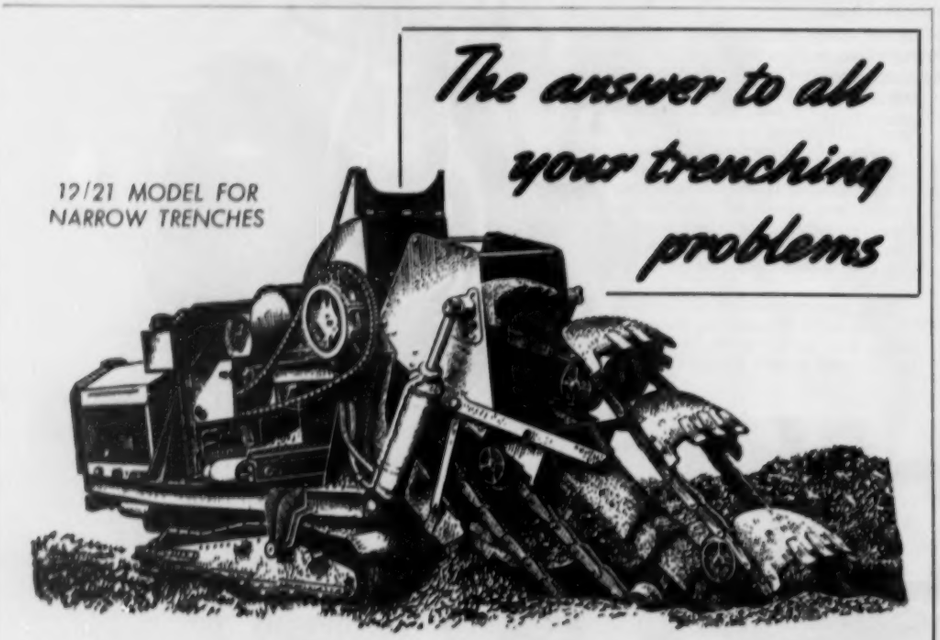
Vickers-Armstrong Ltd. announce that the 18,000 dwt S.T.S. "Hinea," built by them to the order of Shell Tankers Ltd., was successfully launched from their Barrow-in-Furness shipyard August 19, the launching ceremony being performed by Lady Kenning, wife of Sir George Kenning, managing director of the firm of Kennings Claycross, Derby, motor vehicle distributors.

Messrs. Vickers-Armstrong also announce that they have received an order from the Esso Petroleum Company Ltd. for two new tankers each of 36,000 dwt to be built at their naval yard, Walker-on-Tyne.

The propelling machinery will be constructed by Vickers-Armstrong, Barrow. The principal dimensions of the vessel are: length between perpendiculars, 660 feet; breadth molded, 90 feet; depth molded to upper deck, 47 feet; and draft molded, 35 feet four inches.

In 1951, the Shell Tanker Co.'s M. V. "Auris" became the first merchant ship in the world to be powered by a gas turbine. After 15,000 hours' active service in many parts of the world, the existing power units consisting of three diesel alternators and one 1,200 hp gas turbine are being taken out and replaced by a single 5,500 bhp gas turbine unit.

The design and layout of the new installation on the "Auris" is being carried out by British Thompson-Houston Co. (Rugby), makers of her first gas turbine unit, and Cammell Laird & Co., shipbuilders and engineers, Birkenhead, acting in collaboration with Shell's marine research and development department.



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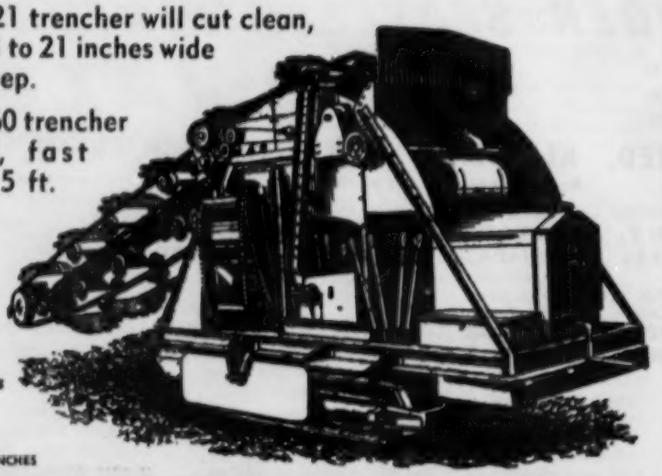
The Model 16/60 trencher will cut clean, fast trenches up to 5 ft. wide down to 14 ft. deep.



Illustrated catalogues sent on request.

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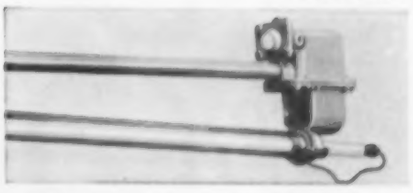

THE GENERAL ELECTRIC CO. LTD. OF ENGLAND

Oil Company Staff Changes

DONALD L. FERGUSON, assistant manager of the East Coast manufacturing division of Esso Standard Oil Co., has been appointed chairman of the security committee of Standard Oil Co. (N.J.). He succeeds Edwin H. Barlow, who retired August 1. The security committee was organized in 1950 to plan measures to assure continuity of operations and preservation of vital records in the event of disaster.

ROY M. MAYS, Denver, has been promoted to manager of exploration for Continental Oil Company's Rocky Mountain region. Formerly regional land superintendent, he will continue to make his headquarters in Denver. Ben D. Donnell, Jr., has been promoted from assistant superintendent to superintendent at Conoco's Rocky Mountain region land department, succeeding Mr. Mays, and C. B. Smith, Jr., Denver, has been promoted to regional geophysicist. Formerly assistant regional geophysicist, Mr. Smith succeeds C. K. Shepherd, who recently was appointed exploration manager of Egyptian-American Oil Co., a Continental subsidiary with headquarters in Cairo, Egypt.

ROBERT E. WHITE, Denver, has been promoted to assistant to the general management of Continental Oil Company's Rocky Mountain region. Formerly regional chief production clerk for Conoco, he will continue to make his headquarters at Denver.

OTIS COONEY, San Antonio, has been promoted to assistant manager of Continental Oil Company's southern region production department. Formerly division production superintendent for Conoco at San Antonio, he will make his new headquarters in Houston.

WILLIAM C. SNYDER has been named government sales representative for Sinclair Refining Co. He succeeds William A. Tracey, who is retiring after 36 years with Sinclair. Mr. Snyder resigned recently from the U. S. Air Force in which he was chief of the Strategic Air Command's Petroleum Division, holding rank of lieutenant-colonel. He had been a member of the Sinclair organization since 1929 with the exception of his time with the Air Force.

R. M. CHURCHWELL, The Ohio Oil Company's division petroleum engineer at Casper, Wyo., has been appointed assistant chief petroleum engineer in the general office at Findlay, Ohio. L. C. Powell, division petroleum engineer at Terre Haute, Ind., succeeded Mr. Churchwell at Casper. R. N. Ayars, assistant division petroleum engineer at Houston, Tex., moved to Terre Haute.

FORREST N. BAUGHMAN has been elected secretary of Envoy Petroleum Co., Long Beach, Calif. Mr. Baughman, former head of the firm's accounting department, succeeds John Lelicoff.

CHARLES E. BRITTON has joined International Petroleum Co. as employee relations advisor. He formerly was engaged in similar work with Standard Oil Co. (N.J.)

F. G. WHITE has been promoted to division superintendent of Magnolia Pipe Line Company's northern division with headquarters at Oklahoma City. He succeeds O. M. Joy, who has retired.

G. W. Petrie, mechanical engineer at Magnolia Pipe Line Company's general offices in Dallas, has been transferred to the South Saskatchewan Pipe Line Co. as main line chief engineer with headquarters at Swift Current, Saskatchewan, Canada.

LUTHER W. RANDERSON, who has been senior petroleum engineer for Magnolia Petroleum Co. at Midland, Texas, has been promoted to section chief in charge of drilling engineering and drilling mud control and transferred to the company's general offices in Dallas.

W. G. MORIARTY has been promoted from assistant division superintendent of Magnolia Petroleum Company's Gulf Coast division, with headquarters at Houston, to division superintendent in the Oklahoma division with headquarters at Oklahoma City. In that position he succeeds the late C. F. Stephenson.

R. W. Lewis, assistant district superintendent of the Kermit producing district, has succeeded Mr. Moriarty at Houston.

C. F. KOCH, formerly district superintendent of Magnolia Petroleum Company's natural gas district at Wewoka, Okla., has been transferred to Pampa, Texas, as district superintendent of the Panhandle district.

W. R. Chandler

W. R. CHANDLER has been elected vice president of the Trans-Arabian Pipe Line Co., it was announced by C. A. Swigart, president. Mr. Chandler joined Tapline in 1946. During the construction period of the line he was successively chief engineer, general superintendent of construction and assistant general manager. He will continue to make his headquarters in Beirut, Lebanon.

CHARLES A. CHIPMAN of Bolivar, N. Y., was reelected to his third one-year term as president of the Pennsylvania Grade Crude Oil Association at the recent annual meeting. Other officers reelected include George J. Hanks, South Penn Oil Co., Bradford, first vice president; A. C. Simmons, Simmons Oil Co., Bradford, second vice president; Fayette B. Dow, Washington, D. C., vice president and general counsel; and the following, all of Oil City: Samuel Messer, Quaker State Oil Refining Corp., treasurer; F. W. Alcorn and C. L. Suhr, both of the Pennsoil Co., and C. G. Johnson of Quaker State Oil Refining Corp., assistant treasurers; and W. C. Wenzel, executive manager.

ROY B. KELLY of Washington, D. C. has been elected president of Venezuela Syndicate, Inc., to succeed H. Harper McKee. In June Mr. Kelly and a group of investors including Cecil V. Hagen of Houston, Clint W. Murchison of Dallas and G. L. Ohrstrom & Co. of New York City purchased stock control of the syndicate. Also elected were James L. Ballard of Houston, vice president, and Holman Jenkens, Murchison's attorney, secretary-treasurer. New directors, in addition to the three officers, are: Cecil V. Hagen and A. F. Childers, Jr. of Houston, Richard R. Ohrstrom of New York City, and Walter M. Spradley of Dallas.

Venezuela Syndicate has substantial holdings in Venezuela, including royalty under 795,000 acres of Mene Grande Oil Co. concessions and 71,431 acres of Royal Dutch/Shell concessions. The company also has 6,200 acres of its own concessions from the Venezuela government as well as producing royalty in the East Texas field and other interests in West Texas.

H. C. WALKER, The Ohio Oil Company's personnel supervisor at Casper, Wyo., has been appointed assistant manager of the personnel department. He succeeds the late J. R. Hause.

C. W. STEPHENS, formerly petroleum engineer in Ohio Oil Company's Los Angeles division, has been appointed senior petroleum engineer and will be assigned special duties. He is succeeded by W. B. Emery II, petroleum engineer at Bakersfield, Cal.

W. H. MAXWELL of the Delta Petroleum Co. represented the United States oil industry during the recent study-tour of Mexico carried out by 22 American business leaders under sponsorship of New Orleans' International House.

JOHN H. TRESCOT, JR., has been appointed assistant manager of the oil department, Climax Molybdenum Co. Mr. Trescot's appointment was announced as part of an expanding program of investments by Climax in water flood properties and semi-proven royalty purchases. Before joining Climax, Mr. Trescot was with the pipe line department of Shell Oil Co.

C. E. COLE has been named manager of the exploration division and L. A. Braly superintendent of the land department of Arkansas Fuel Oil Corp. Mr. Cole, who has served as chief geologist since June 1953, succeeds E. L. Caster, who died recently. He will also continue to serve as chief geologist. Mr. Braly is moving to Shreveport from Fort Worth, Texas where he was southwestern division land man for the Cities Service Co. (Del.).

MYRON C. KIESS has been named geological manager for Sunray Mid-Continent Oil Co. Mr. Kiess was chief geologist for Mid-Continent Petroleum Corp. before the recent merger with Sunray Oil Corp. Stefan Von Croy has been promoted to chief geophysicist from his former position as division geophysicist. Sherril A. Shannon and Bert C. Timm, former division geologists, have been named chief geologists.

Rounding out the company's main office staff are Fred Phelps, senior research geologist; Dave Jewell, his assistant; Thomas A. Clote, division geologist in north Louisiana, Oklahoma and southern New Mexico; and Joe S. Peerson, division geologist in central, west and south Texas.

M. C. Kiess *S. Von Croy* *S. A. Shannon* *B. C. Timm*

R. W. Griffith

ROBERT W. GRIFFITH has been appointed general manager of the gas-gasoline division of the production department of Sunray Mid-Continent Oil Co.

E. J. Mills will continue as manager of field plant operations. C. F. McCarroll will be manager of the gas sales division, and Carl A. Lemon will be manager of LPG product distribution and sales from field plants.

RUSSELL L. MAYCOCK has been appointed director of Shell Chemical Corporation's Houston research laboratory. He formerly was assistant manager of the physical chemistry department at Shell Development Company's Emeryville research center. He will replace J. Anderson, who was named director of the research laboratory located at Shell's synthetic rubber plant in Torrance, Cal.

JOHN W. NIXON has been appointed plant manager for the National Petro-Chemical Corp. operation at Tuscola, Illinois. Mr. Nixon has been chief engineer at the plant since May 1952 when he was first employed by Petro. His previous experience includes 18 years with a major oil company as assistant chief engineer and construction superintendent.

Other promotions announced concurrently with that of Mr. Nixon include: Charles D. Carnes, from assistant chief engineer to chief engineer; George A. Siegelman, from plant superintendent to assistant plant manager; Clifford E. Oman, from area superintendent of alcohol plant to assistant plant superintendent; and Robert E. Jones, Jr., from area superintendent of ethyl chloride to area superintendent of alcohol and ethyl chloride processes.

R. A. EEDS has been elected vice president in charge of industrial relations for the Arabian American Oil Co. He was formerly general manager of operations. Mr. Eeds will continue to be stationed at Aramco's headquarters in Dhahran, Saudi Arabia.

R. A. Eeds

H. H. Hewetson

A. Myra

HENRY H. HEWETSON, who joined the Standard Oil Co. (N. J.) organization 31 years ago as a student engineer, has been elected a vice president. A director since 1950, he has served with Jersey Standard affiliates as an engineer and as a manufacturing and marketing executive in Canada, South America, Europe and the United States.

Mr. Hewetson was elected a director and vice president of Imperial Oil Ltd. in 1940, president in 1945, and chairman of the board of directors four years later. This period of his leadership of Imperial was marked by the most extensive search for oil in Canada's history, resulting in major discoveries in Western Canada and bringing historic changes to the entire Canadian petroleum industry.

ROBERT H. COLLACOTT has been appointed director of public relations for The Standard Oil Co. (Ohio). He has been assistant to the chairman. Frank J. Kovac was named assistant manager.

J. E. BOUNDS has been appointed general manager of the tax department of Gulf Oil Corp. He succeeds Fred B. Branson, who recently was elected comptroller of the company. Mr. Bounds, prior to his present appointment, was divisional comptroller of the company's production division at Tulsa.

ALLEN MYRA has been appointed managing director of Standard-Vacuum Oil Company's refining subsidiary in Bombay. He succeeds W. A. Williams, who has returned to the company's New York offices for further assignment. Mr. Myra joined Standard-Vacuum Refining Co. of India, Ltd. in 1952 as general superintendent and became a director a year later.

A Canadian citizen, Mr. Myra began his oil industry career in 1934 at the Halifax refinery of Imperial Oil Ltd., serving successfully as chemist, process engineer and head of the process control department. After an assignment in Imperial's executive offices in Toronto, he went to Edmonton as process engineer engaged in all phases of construction, organization, start-up and operation. He continued there until joining Stanvac.

LEIGH S. MC CASLIN has been appointed assistant advertising manager of Sunray Mid-Continent Oil Co. He will serve as assistant to C. F. Niessen.

Before joining D-X Sunray, Mr. McCaslin was advertising and sales promotion manager for Deep Rock Oil Corp.

DONALD F. STEINKLE has been appointed assistant training coordinator of Standard-Vacuum's producing and refining subsidiary, Standard-Vacuum Petroleum Maatschappij, in Indonesia. He was formerly director of power education at the Dow Chemical Co., Midland, Michigan.

Mr. Steinke will be stationed at the Sungei Gerong headquarters of the Stanvac affiliate (SVPM) near Palembang on the island of Sumatra. In his new position, he will assist in directing an extensive training program for SVPM's 13,000 employees in Indonesia, about 95 percent of whom are Indonesians.

EMIL KLUTH, executive vice president of Pacific Western Oil Corp., has retired from active duty after almost 40 years' service with enterprises controlled by the Getty family. He will continue to serve, however, as a vice president and director in an advisory capacity. He was succeeded by George F. Getty II, son of J. Paul Getty, president of Pacific Western and grandson of the late George F. Getty, founder of the Getty interests.

J. W. HOPKINSON, president of the Penn-Petroleum Corp., Detroit, was named president of the American Society of Lubrication Engineers at their 1955 Annual Meeting. W. Deutsch of the Trabon Corp., Cleveland was elected vice president at large; E. R. Booser, General Electric Co., West Lynn, Mass., is the new secretary; and W. H. Fowler, Jr., of the Pure Oil Co., Chicago, Ill. is treasurer for the term 1955-56.

Regional vice presidents elected were: G. R. Armstrong, B. Greening Wire Co. Ltd., Hamilton, Ont.; E. D. Harkins, Sr., Farval Corp., Indianapolis; J. O. McLean, Reynolds Metal Co., Richmond, Va.; and M. H. Sperling, Richfield Oil Corp., Los Angeles.

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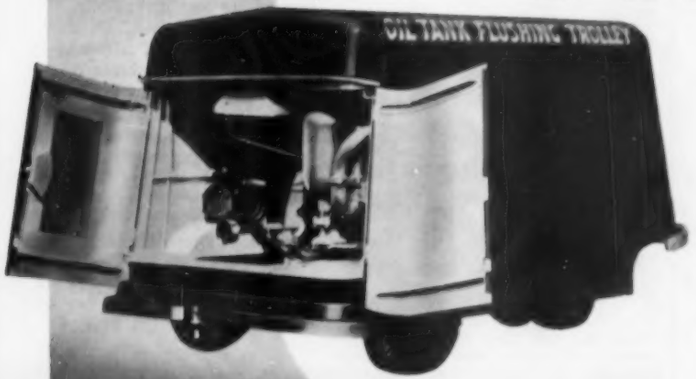

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R. E. Kramer

Appointed Hammond District Sales Manager

Ralph E. Kramer, vice president in charge of sales for Hammond Iron Works, announced the appointment of Fred J. Myers as district sales manager, with headquarters at Warren, Pa. Mr. Myers has spent the last few years with Lukens Steel Co. and before that with Welding Engineers, Inc. During World War II he served as captain in the Army Engineers Corps.

Side Wall Coring

Schlumberger Well Surveying Corp. has published a colorful new booklet describing the Schlumberger side wall coring device and how it works. A series of full color plates are printed showing samples of cores recovered by this method in many U.S. oil fields.

Equilibrium Ratio Data Book

A new volume covering the quantitative effects of composition on K-values, titled *Equilibrium Ratio Data Book*, has been published by the K- Committee of the Natural Gasoline Association of America. This book performs a real service to the petroleum industry in accurately consolidating miscellaneous data and in its presentation of 131 easily-used charts covering a broad range of convergence pressures for absorbers, crude flashing towers, strippers and stabilizer mixtures, as well as K charts for hydrocarbons and other compounds. The volume is preceded by a foreword giving the story of the committee and its future plans, as well as instructions on the use of K charts.

The book may be obtained from the Natural Gasoline Association of America, 421 Kennedy Building, Tulsa 3, Oklahoma. It is available in two forms; complete in five ring, looseleaf, heavy canvas binder at $12.00 per copy, or the entire contents punched for three ring binder at $9.00 per copy.

Oil Progress Kit for Kiddies

A souvenir cut-out kit that will fascinate youngsters and entertain their elders has been prepared by the American Petroleum Institute for distribution by local oil companies during the eighth annual observance of Oil Progress Week. Each kit contains a chart of oil installations, a sheet of numbered cut-outs, a page of instructions, and a booklet on the birth of the U. S. oil industry. The kits are available through the Institute or District Offices of the Oil Industry Information Committee at $8 per hundred.

New Platformer

A new 5,000-barrel Platforming unit has gone on stream at the Champlin refinery, and a new fluid catalytic cracking unit will be completed within three months. The units are part of a $4 million refinery improvement program.

Dr. C. A. Stokes

Texas Butadiene Appoints Stokes

Dr. C. A. Stokes has been elected vice president and technical director of Texas Butadiene & Chemical Corp., Houston, Texas. He is also a director of Petrocarb, Inc., New York. For the past 10 years, Dr. Stokes served as director of research and development for Godfrey L. Cabot, Inc., Boston carbon black and chemical manufacturing firm.

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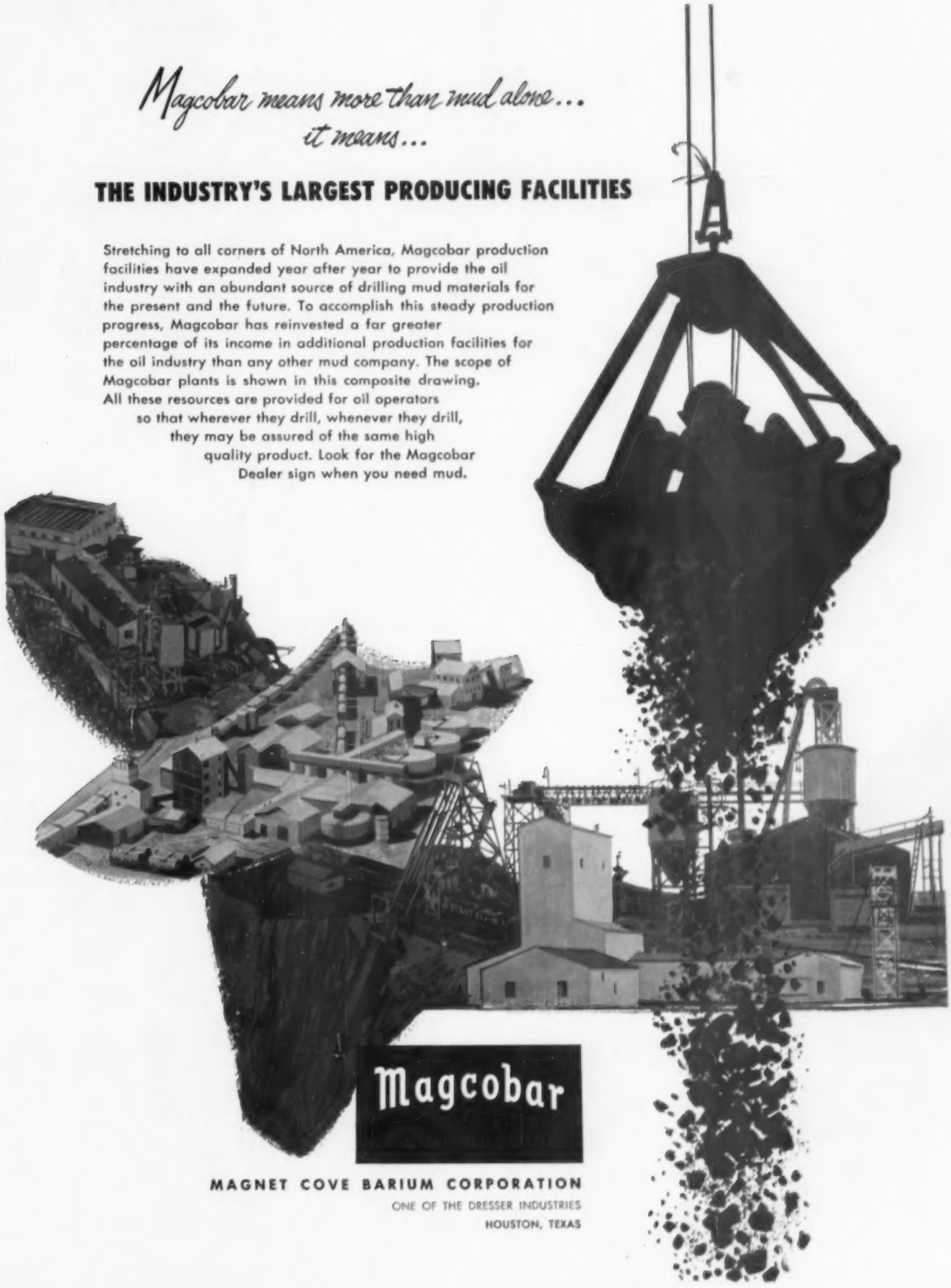

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